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the glass industry

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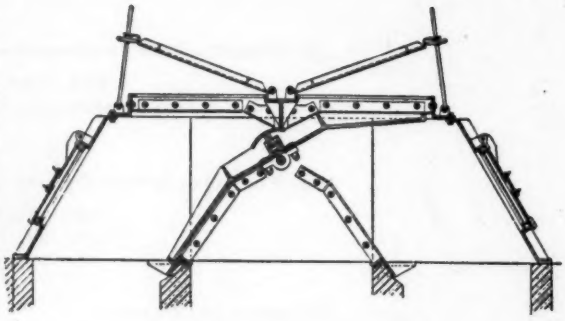

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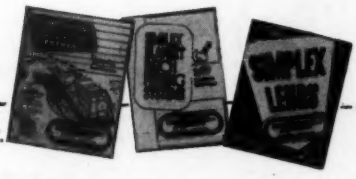

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THE GLASS INDUSTRY

VOLUME 35, NUMBER 1, JANUARY, 1954

A REPORT ON THE FOURTEENTH ANNUAL CONFERENCE ON GLASS PROBLEMS

The Fourteenth Annual Conference on Glass Problems was held at the University of Illinois, Urbana, Illinois, on December 3 and 4. This Conference, held alternately at the University of Illinois and Ohio State University, is attracting more interest each year. This year there were approximately 175 in attendance, including representatives from Mexico and Canada, and an excellent program was provided under the leadership of Drs. Tooley and Blau.

The program was comprised of 18 papers devoted to (1) Raw Materials, (2) Refractories for Furnaces, (3) Finished Product Quality and (4) Special Problems Related to Packaging and Shipping.

The group was welcomed to the Conference by Ross J. Martin, Associate Director of Engineering Experiment Station, University of Illinois. Professor Martin pointed out that over 200 projects requiring 4 million dollars per year were at present underway at the Engineering Experiment Station. He warned against the trend toward increased use of government funds for such work because of the drain upon the taxpayer's dollar, favoring the more direct approach in which industry went directly to the University for both fundamental and applied research. Mr. Martin emphasized the fact that the research of today is the technology of tomorrow.

The morning session, Thursday, December 3, was devoted to problems related to Glass and Batch Control, and R. L. Tiede, Owens-Corning Fiberglas Corp., was Chairman.

J. P. Poole, Brockway Glass Co., Inc., in his paper, "Control of Batch and Glass Composition", presented the details of a comprehensive program practiced in the careful control of batch to provide a glass of constant composition. The rewards of such a program are great and provide a basic product of acceptable quality. The completeness with which a certain raw material is checked is dependent upon the prior knowledge of variations that can be tolerated without materially affecting the operation of the forming machines. Generally it is desirable to obtain analyses, both physical and chemical, of material prior to unloading, and spot tests should be made from time to time to see if material received conforms to specifications.

Good scale maintenance and frequent checks on the accuracy of weighing are desirable. The proper mixing of the batch may be of paramount importance, and a number of accelerated tests are available to check such errors. Acid insoluble, water insoluble, alkali titration, conductivity and preparation of flash melts are all successfully used to ascertain whether or not the batch is being properly mixed or de-mixed. It was also recommended that total weight of the batch be frequently checked in order to establish whether or not all the materials have been properly added.

Some interesting data were submitted to show the relationship between mixing time and tendency to de-mix, for time may be quite critical with a certain batch and mixing equipment. The basis of this time control was the use of the acid insoluble test.

For routine measurements of glass, it was recommended that density, softening point, annealing point, strain point, flow point and melting point tests be made and the relation of viscosity and time be established. It was also pointed out that index of refraction, coefficient of expansion, electrical conductivity and durability might occasionally assume importance and be desirable to know.

The subject of furnace evaluation was considered, and a proper evaluation of cords, seeds, blisters and color was recommended as being the most important.

The proper evaluation of control tests is of extreme value because they (1) predict in advance what changes are likely to occur in the glass and, hence, the operator can correct ahead of time; (2) form the basis for any formula change; (3) eliminate the guess-work from trouble shooting; and (4) when properly evaluated, eliminate extra work and expensive losses.

"Physical Properties for Glass Control" was the subject of a paper by H. R. Lillie, Corning Glass Works. The primary purpose of control is always to keep a product, being continuously produced, within acceptable limits as to its chemical composition and physical properties.

The criteria for good control measures are (1) they must permit constant vigilance; (2) they must involve meaningful tests; (3) they must allow the operator a safety reserve; (4) they must permit a sufficient time

lapse to correct errors; (5) they must be simple. Dr. Lillie's talk was concerned with the control of a continuous melting operation where the variations with time are slow.

The tests considered to be important in control were viscosity, flow point, softening point, annealing and strain points, expansion, density, electrical properties, index of refraction and dispersion, and transmission and color. Examples from production records on commercial glasses were given to indicate that production mistakes were being made and the quality of the glass was being reduced.

Fred Motsch, Foster-Forbes Glass Co., in his paper on "Specifications and Control on Raw Materials", listed sand, soda ash, limestone and feldspar as the most important materials to watch and control in a container plant. The important materials were considered on the basis of a questionnaire sent to a number of plants in the industry.

The common troubles arising from use of these raw materials are (1) high Fe content, (2) contamination by foreign materials, (3) variation in grain size.

The speaker recommended that each plant should (1) Obtain all tests made by supplier on each car of raw materials and set up maximum and minimum requirements of this test. (2) Run check analyses periodically in order to check supplier. (3) Have unloader report condition of each car as received. (4) Closely control and supervise the batch plant. (5) Check frequently total weight of batch. (6) Ring-test for cords every 6 hours. (7) Take seed and blister count each day. (8) Check density on each furnace twice a week (min.). (9) Take chemical analysis every 3 months (min.).

"A Method for Obtaining Glass Samples from a Continuous Tank" was presented by E. L. Woodall, Jr., General Electric Company.

A unique attack on the problem of sampling hot glass from a continuous furnace was presented by Mr. Woodall. Although its importance has been recognized for many years, this problem has defied solution for considerable time. It has been necessary to know the exact condition of glass, both vertically and horizontally, within a tank; that is, is it homogeneous, or is it layered and stratified? The problem of accurate sampling offers considerable difficulties.

The technique proposed is to provide fused quartz sampling tubing approximately 2" in outside diameter and 7/8" inside diameter. The tubing, which may be 14 feet long, is bent by heating in a special furnace to any desired arc, depending upon the furnace to be sampled. The degree of bending depends upon the cross-section desired for sampling. The tube is placed in the tank under internal pressure, and suction is applied at the time of sampling which is determined by the position of the sample tube. After the desired sample is taken, the tube is removed from the furnace, and the glass sample forced out of the sampling tube under pressure into a metal mold, after which the glass is wrapped in asbestos paper and annealed. Samples have been taken from the melting and refining end and desired sections of the tank through burner ports and rake-out holes, as well as the roof. The samples, after annealing, can be analyzed chemically, as well as physically, and these properties related to its position in the tank.

The results were correlated with feeder performance in a continuous tank and showed rather conclusively that improper feeding of batch or improperly mixed batch on one side of the tank caused the glass to move through the tank in an inhomogeneous manner. The convection currents in the tank did not seem to correct this condition or homogenize the molten glass to any appreciable degree. This technique appears to be an extremely valuable one and may offer a means of studying the flow of hot glass through the tank, convection currents and tank performance in general.

The afternoon session was devoted to refractory application in the glass industry. Under the capable leadership of Roy Arrandale, Thatcher Glass Manufacturing Co., Inc., this session provided a lively discussion and many comments.

J. A. Johnson, Findlay Clay Products Company, in his paper on "Types of Refractories for Glass Melting Furnaces", listed the following requirements for refractories pots, day tanks and continuous tanks:

(1) The body should be of medium density in order that it might stand considerable heat shock and at the same time provide reasonable resistance to erosion by the glass.

(2) Refractories for day tanks demand a rather dense body but should withstand spalling or sudden temperature changes. Sillimanite and mullite bodies have given good performance. The latest developments have been elliptical shaped tanks with cast crown of highly siliceous character. Casting of these smaller crowns seems to be practical.

(3) For continuous tanks, Mr. Johnson believes that a highly refractory PCE Cone 33 clay block is desirable and will give a definite advantage in fuel saving due to high heat conductivity.

The many advantages of clay refractories were also stressed.

"Glass Tank Regenerator Checkers" was the subject of a paper by W. F. Rochow and L. L. Gill, Harbison-Walker Refractories Company. The desirable properties of regenerator checkers were discussed by Mr. Gill. He stressed the fact that the ability to transfer heat may not be the most important property for this type of refractory.

Factors contributing to the breakdown of such refractories are as follows: (a) fluxing of surface or chemical attack; (b) clogging due to dusting; (c) spalling; (d) nephelite formation due to hot face formed back from face and causes breaking or shelling; (e) catalytic deposition of carbon due to reduction from CO.

A large variety of brick are available for this type of work, including fireclay brick, super-duty fireclay brick, silica brick and semi-silica brick. Fosterite (magnesium silicate) and magnesite chrome brick have given excellent results in some installations. Silica brick have given fine results in a borosilicate glass tank. It was also reported that super duty (80% Al_2O_3) brick have been used in contact in some checkers.

Various methods of setting the brick in checkers were shown in order that a desirable and inhibited flue might be obtained.

The use of basic refractories is increasing every year, as the advantages of non-wetting by alkalies is more fully realized. Significant improvements have been made in preventing the loss of strength of basic brick when subjected to alternate oxidizing and reducing atmospheres.

Attentive Group Listens to Paper Being Presented at Glass Conference.

Another advantage to basic brick checkers is that it is possible to reuse or reclaim a considerable number.

In his talk on "Glass Tank Insulation", H. W. Baque, Corhart Refractories Company, said that the insulation of glass melting tanks in all their parts seems to be attracting a growing interest among operators. The simple answer seems to be that refractory manufacturers have improved their products over the years to a point today where this is possible.

Insulation of various parts of the tank were discussed:

Crowns. These should have silica insulating brick over the crown brick, with a covering of a plastic high-duty insulating material. It is recommended not to insulate an old one that has dust on it and in the joints.

Breastwalls. Breastwalls are and have been insulated for many years.

Port necks. The insulation of port necks offers some interesting by-products in addition to reducing thermal losses from a very considerable area of radiating surface. Insulation can make the changing of burners a more comfortable job. It also prevents glassy buildup in the ports. Apparently, such buildup is caused by condensation of vapors, which can be prevented by maintaining a high enough temperature in the inside surface of a port neck.

Melter sidewalls. It is debatable whether or not melter sidewalls should be insulated in a flint glass furnace. In the manufacture of colored glasses, one of the great problems is to maintain below the surface glass temperatures that are high enough to speed the solution of stones and even batch that becomes stagnant in low temperature viscous glass.

Several operators have insulated amber and green bottle furnaces with amazing results in the way of reducing stone losses in their product.

Melter bottoms have been insulated by paving fusion cast block over clay bottoms. It is recommended that pavings be laid in a bed of resistant mortar because the secret of a successful pavement probably lies in holding the glass to its top surface and not allowing any to get beneath it.

There are today approximately 50 furnaces in operation with some sort of bottom paving or insulation.

S. M. Swain, North American Refractories Company, spoke on "Refractories for Glass Tank Crowns". The basic service requirement of glass tank crowns are adequate strength, low heat loss, resistance to fluxing as vapor attack from alkalies and boron, and compatibility with glass being made by drippings from the roof. Economic requirements are reasonable low cost of product and availability in commercial size tolerances.

The materials used at present are regular silica brick which have excellent strength up to their softening point of 3000°F. Fluxes penetrate to a shallow depth, while the remainder of the roof will carry the load. The heat losses are relatively low and resistance to fluxing is good, and drops from roof are compatible with the glass, providing that sufficient time be allowed for assimilation. The expansion characteristics are high at low temperatures and thus require slow heating initially. There is no appreciable volume change in service. The usefulness of silica brick in crowns has been greatly improved by the use of improved silica mortars. These mortars contain no clay. Therefore, they are as refractory as the brick. They are highly plastic and possess low shrinkage.

Super quality silica brick are now available for crowns. Because they are of higher purity (contain less impurities, especially alumina), they are more refractory. Otherwise their properties are quite similar to the regular silica brick.

Fireclay brick have been used for smaller installations, especially day tanks, largely because of their superior spalling reistance and relatively low temperature of operation. In general, they are not as strong as silica brick, and if drops from the crown occur, they are more difficult to assimilate. Also the tendency to shrink may cause some volume instability. Fireclay brick are rarely used for soda-lime tanks but have had considerable application in sodium silicate tanks.

High-fired kaolin brick have found use in borosilicate tanks because of the superior resistance to fluxes at very high operating temperatures. Their superiority is largely due to their increased refractoriness, volume stability and uniform reversible thermal expansion. Their cost is higher than silica brick.

Various methods of construction were considered. A bonded construction is preferred because of mechanical stability.

"Special Refractories for Super-Structure and Feeder Parts" was presented by R. W. Knauft, The Chas. Taylor Sons Company. The all-clay tank refractories have been superseded by vacuum cast refractories and they in turn by the so-called line of super refractories. Mr. Knauft stressed the fact that the vulnerable points of the tank are constantly changing, owing to the fact that one spot is improved by a better refractory and then the operating temperatures are increased which in turn produces a failure in an entirely different area. The most recent improvements have been made by the use of bonded mullite brick and zirconia refractories.

The importance of protecting one refractory by an-

other was emphasized. It is advisable many times to protect the investment of existing installations by selected application of another refractory. In this regard, it was pointed out that zirconium refractories could be used as a separator between silica and alumina bearing brick. The zircon will not be washed by silica above, but it is not recommended to place zirconium refractories below alumina bearing brick because alumina will wash over zirconium below.

Zirconium refractories have given excellent results as a bottom in opal tanks and have also been used with considerable success as super-structure and feeder parts.

"Sidewall and Superstructure Refractories Application in Glass Tanks" is the title of a paper presented by O'Mara White, Carborundum Company. Mr. White pointed out that refractories in the melting and refining zone were usually confined to a combination of refractories rather than one single type. For this purpose, he recommended the use of fusion-cast refractories in which the refractory is made by an actual complete fusion-cast of the material. These materials are best represented by one of the following types:

(1) Mullite: 72% Al_2O_3, 20% SiO_2

(2) Zirconia: 40% ZrO_2, 40% Al_2O_3, 10% SiO_2

(3) Alumina: 98% alpha and beta Al_2O_3, 2% SiO_2

(4) Alumina-chrome: 80% Al_2O_3, 9% Cr_2O_3

Most of the above-mentioned refractories contain various percentages of glass, and it was pointed out that there is a definite trend to reduce the amount of the glassy phase in such refractories. The newer products are giving superior results, longer life and resistance to glass corrosion. A high content of beta alumina produces a porous-like structure that offers greater resistance to sudden temperature change and is easier to finish, cut and shape.

Emphasis was given to the use of full-depth sidewall construction rather than multiple-course structure where the lateral joints offer a source of failure and contamination.

This session, which was so ably handled by Roy Arrandale, closed with a "square-table" discussion in which the various authors were asked numerous pointed questions regarding the use of their products as glasshouse refractories. Some of the answers follow.

(a) Bottom and sidewall insulation should reduce convection currents, reduce tendency to form seeds and improve quality of the glass.

(b) Vacuum cast fireclay refractories save about 8% on fuel costs.

(c) Larger flue openings at the top and smaller at the bottom are desirable for checker's construction.

(d) Casting scars on fusion-cast blocks should be turned outside rather than inside in order to provide less hazard of corrosion.

(e) Separation wall in checkers between producer gas and air chamber is a structural problem. Thick wall with air cooling has helped.

(f) Double sidewalls in which fusion-cast blocks are laid inside clay refractories may be the most effective way of insulating sidewalls.

(g) Sidewall and superstructures are responsible for over 50% of the refractory-stone troubles.

(h) Cast crowns and monolithic-sidewalls are important future possibilities.

(i) Care and proper selection of refractories for the service area under consideration becomes of paramount importance in producing high quality glass and reducing fuel costs.

George Thornton, Ottawa Silica Company, served as Chairman for the Friday morning session, devoted to the discussion of raw materials.

Wm. J. Woods, Jr., Pennsylvania Glass Sand Corp., presented a paper on "Silica Sand: The Principle Glass-Forming Oxide".

Silica is not only the predominating constituent in the glass batch, but it contributes to glass the characteristics that make it a glass; namely, that it can be cooled from a molten condition to that of a solid at ordinary temperatures without crystallizing.

The association and characteristics of the impurities in sand were discussed. The impurities are iron, lime, titania, alumina and alkalies. Iron appears to be the most important and should be kept at a minimum.

The better sand deposits are found in California, Oklahoma, Missouri, Illinois, Pennsylvania and New Jersey. A description was given of the complete winning and refining of sand. The requirements of modern plants include enough water to supply a city the size of Salt Lake and enough power and electricity to supply a city of 35,000 population. Some plants are capable of supplying 10,000 tons of glass sand per day with a purity greater than 99.90% SiO_2.

"Alkalies and Glass: Allied Industries" was the subject of a paper by H. W. Harrington and R. V. Yount, Solvay Process Division, Allied Chemical and Dye Corp.

The complexity of the alkali industry was stressed by Mr. Harrington, who also showed its interdependence with allied industries. The important alkali raw materials for the glass industry are soda ash, potash, salt cake and sodium nitrate. The glass industry consumes about one-third of the entire soda ash production, one-half the potash production and one-ninth the sodium nitrate produced.

The history of the alkali industry was traced from the beginning of the Solvay process in France 88 years ago. Strangely enough, no newer process has taken its place, although numerous improvements have been made to make the process more productive and efficient. The important fact is that the quality of the product has gone up and the price reduced, which has definitely aided the glass industry.

All alkali raw materials should be stored in tight containers which are free from moisture. Soda ash should not be stored longer than three months. Hydrated potassium carbonate is more likely to hydrate than calcined potash and must, therefore, be stored carefully. Salt cake, on the other hand, offers little difficulty in handling and storage.

"Dolomite for the Glass Industry" was the subject of a paper by Louis G. Love, National Lime and Stone Co. The glass industry consumes approximately 10-20% of the entire production of the lime industry. Because the glass industry desires a grain size from —12 mesh to +120 mesh, the lime industry must find a suitable market for both the coarser and finer grades of stone.

Dolomites are found in California, Michigan and Ohio, as well as the eastern part of the United States. They are obtained in remarkable purity, in which the

(*Continued on page* 38)

MOLD IRONS FOR THE GLASS INDUSTRY

By NEWTON DAVIS, Metallurgist

Overmyer Mould Company, Inc., Winchester, Indiana

As a major producer of glass mold equipment, serving not only the United States but all countries where glass is made, we have for many years recognized the fact that it is too much to expect that any one mold iron will completely meet the requirements of the glass industry of today. The production of glass articles has become so complex and so diversified that it has become necessary that mold equipment be "tailor made" to give maximum production life.

General Requirements

Some of the most important requirements for a good glass mold iron are as follows: (1) must be readily machinable; (2) must have a dense and close grained structure; (3) must take a high polish; (4) must resist heat and corrosion; (5) must resist growth and scaling; (6) must be of a stable character to resist dimensional changes under the repeated heating and cooling to which it is subjected.

A soft, high carbon cast iron, cast against a chiller to produce a dense, close-grained structure, fulfills the requirements for a good all-purpose mold iron. For some special applications, a low carbon unchilled iron is preferable. The size, shape and distribution of the graphite flakes are of great importance in a mold iron. The long inter-twining graphite flake form is conducive to growth in that it affords an excellent passageway for the penetration of gases. A cast iron which contains short and well dispersed graphite flakes is in a better position to resist growth and scaling. Heat, corrosion and growth properties can also be improved by the use of suitable alloying elements.

Use of Alloys

The proper use of alloying elements greatly improves the properties of a good base iron. A few years ago we conducted a series of tests in which many different ferro-alloys were employed to determine their effect upon the graphite particle size, shape and distribution, and also their effect upon the matrix structure when added to a suitable base metal. The use of chromium, nickel and molybdenum when used in combination of selected percentages proved to have the most favorable effect.

Nickel and chromium are used together in gray iron primarily for the purpose of refining its structure in addition to hardening and strengthening it without impairing its machinability. Chromium increases the chilling tendency of iron and promotes the formation of free carbide, and its hardening effect on iron is partly due to carbide formation. One part of chromium will approximately neutralize and balance three parts of nickel in chilling effect. Chromium must be used with caution if machinability is to be preserved.

Nickel and chromium should be added to iron in the proportion in which they mutually neutralize each other in respect to chill. The resulting alloy iron will have the same chilling tendency as the plain iron to which the alloys were added, and castings made from it will consequently be as readily machinable as castings from the plain base iron. At the same time the refining, matrix hardening and strengthening effects of both alloys will be conserved and reflected in the structure and properties of the casting. It is this method of using nickel and chromium, in balanced proportion, which usually gives optimum results in respect both to machinability and to mechanical properties.

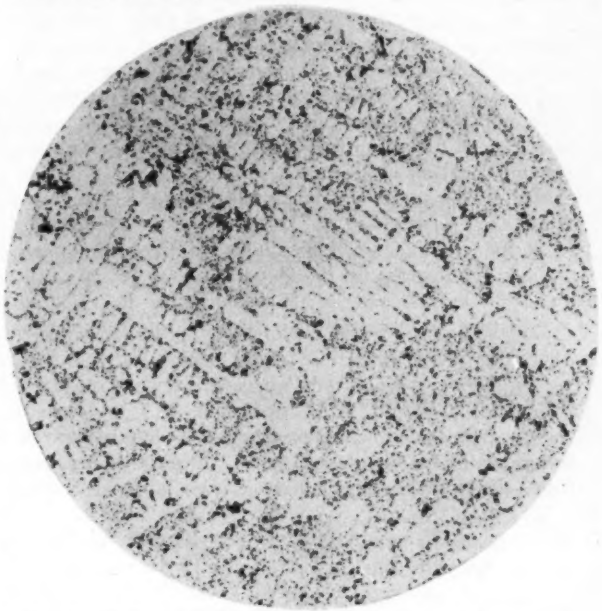


Fig. 1. Flake type graphite. Mag: 100X. Etch: None.

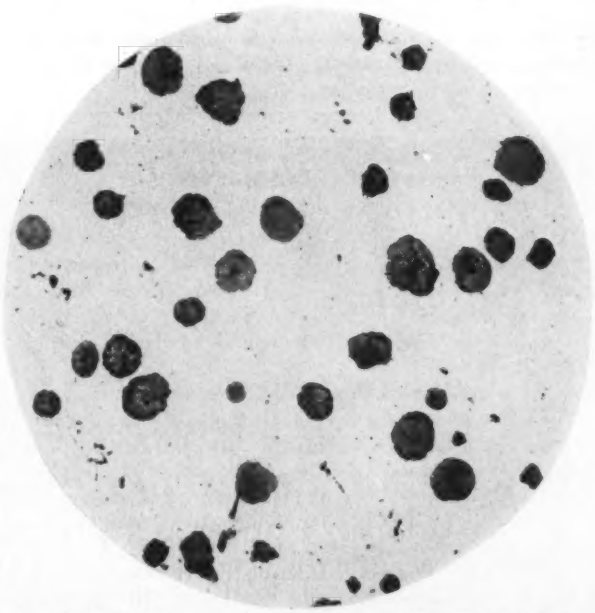


Fig. 2. Nodular type graphite. Mag: 100X. Etch: None.

One of the effects of molybdenum is to reduce the section sensitivity of gray iron. This makes it possible to obtain quite uniform properties with the same composition in different castings with widely varying mass and section, as well as in a casting incorporating both light and heavy sections. Molybdenum improves the high temperature, strength and toughness of cast iron. In combination with nickel and chromium, it gives irons with reduced tendencies towards growth and oxidation at elevated temperatures.

Chiller to Casting Section Ratio
Chemical Composition

After a suitable chemical composition has been established and adhered to from day to day, it is imperative that a close study and control of chiller ratios be followed in order to produce an iron that is not only dense and close grained, but also one that is free of hard and brittle (carbidic structure) corners and edges. A close control of chemical composition must be maintained at all times and this can be done only by frequent chemical analysis of the iron.

Our molten metal is subjected to an inoculation treatment, as it flows down the spout to the receiving ladle, to further minimize the possibility of hard edges and to insure uniformity of the metal from tap to tap. Frequent checks are made of the metal before it is poured into castings to make sure it is "in line" and suitable for the molds to be poured.

Five Types of Mold Irons

At the present time we are producing five mold iron specifications for the glass industry. A chemical analysis and a general recommended usage is as follows:

Omiron #1	Base Iron
3.60-3.70	Total Carbon
1.90-2.20	Silicon
.70- .80	Manganese
.12	Max. Phosphorus
.08	Max. Sulphur

Base metal is inoculated to provide maximum machinability and uniformity in structure. Although Omiron #1 may be used with good results in many applications, it is primarily recommended for castings that do not come in direct contact with glass, such as plunger heads, solid rings, cages, etc.

Omiron #3. Omiron #1, plus an addition of .20%-.25% of chromium and .70%-.25% of nickel, will provide a harder, more dense and heat resisting cast iron. It is recommended as an all-purpose alloyed iron for any part of mold equipment that comes in contact with glass, such as bottom plates, baffles, small plunger tips, two part molds and blanks, etc.

Omiron #4. Omiron #4 is the same as Omiron # 3, plus an addition of .20% molybdenum. This type of iron is recommended for all items where the wall section of casting varies from thin to thick, such as solid molds, blanks, plungers and valves for press operation. Also, blow-blow equipment where the glass article requires a high polish and lustre.

Omiron #5. Omiron #5 is a base iron with an addition of .30% chromium, .90%-1.00% nickel and .25%-.30% molybdenum.

This specification was developed to meet the requirements of one customer to provide a somewhat harder, more stable iron. Although some degree of machinability is sacrificed, the higher alloy addition has proven to be beneficial in many press applications and where glass temperatures are higher.

Omnod. Omnod is a ductile, nodular graphite iron. The manufacture of ductile cast iron by the addition of magnesium to a gray iron is covered by patents issued to the International Nickel Co., Inc.

Ductile iron possesses physical properties that would indicate an ideal glass mold iron. An outstanding feature of omnod (ductile iron) is its superior heat resistance, growth resistance and corrosion resistance qualities. Omnod machines like mild steel and takes a very high polish. Glass produced from this iron exhibits an improved appearance and lustre. Although nodular graphite iron will probably not replace a very large percentage of flake type gray iron for glass molds, it is believed that it will find wider use and acceptance in the press and specialty shops.

WESTVACO CHEMICAL DIVISION REORGANIZES

On January 1, 1954, Westvaco Chemical Division, Food Machinery and Chemical Corporation, reorganized into two separate operating divisions to be known respectively as Westvaco Chlor-Alkali Division and Westvaco Mineral Products Division of the Food Machinery and Chemical Corporation, it has been announced by Paul L. Davies, President.

Westvaco Mineral Products Division will be responsible for products manufactured at Carteret, New Jersey, Lawrence and Sunflower, Kansas, Modesto and Newark, California, and Pocatello, Idaho, plants, which include phosphorus, phosphates, barium chemicals and magnesium chemicals. W. N. Williams, Westvaco's Operating Vice President, will be President of this new division.

Westvaco Chlor-Alkali Division will be responsible for products manufactured at the Charleston, West Virginia, and Green River, Wyoming, plants, which include chlorine, caustic soda, soda ash, chlorinated chemicals and carbon bisulphide. Franklin Farley of the Administrative Staff, FMC Chemical Divisions and previously a Vice President of the International Minerals and Chemical Corporation, will be President of this division.

Both Mr. Farley and Mr. Williams will report directly to Ernest Hart, Executive Vice President, Chemical Divisions of Food Machinery and Chemical Corporation. Sales and service groups as now constituted will continue contacts with customers on all products.

Also announced is the appointment of Louis Neuberg, Vice President-Sales of the Westvaco Chemical Division, as Vice President of the Chemical Divisions of the corporation. Mr. Neuberg will continue his headquarters in New York City.

• Arthur W. Little, Inc. will open a western regional office in San Francisco early in 1954, according to Dr. Earl P. Stevenson, President.

MARKETING PROBLEMS EMPHASIZED AT G.C.M.I. MEETING

Adoption of a market research program aimed at exploring present and new markets was voted at the Fall Meeting of the Glass Container Manufacturers Institute at Ft. Lauderdale, Florida, December 1 to 3. This action followed a two-part presentation of a survey of the entire packaging market by R. L. Cheney.

F. B. Pollock, Thatcher Glass Manufacturing Company, Chairman of the committee which guided Mr. Cheney's survey work, told the meeting after the report was presented that the survey was the "first basic approach to the problem". The survey was called for at the Institute's Spring Meeting when Mr. Cheney was appointed to make a thorough study of the packaging industry and the position of the glass container in this field.

Mr. Pollock said that the plan is to establish a Market Research Division within the Institute to further study the market potential for the industry, including the possibilities for technological improvements. The Division would also make recommendations from time to time as to programs of a promising nature that might be undertaken.

Glass Container Manufacturers Institute members approved the new program by adopting unanimously the 1954 budget presented by the Board of Trustees. The Trustees also announced that R. L. Cheney, West Coast Manager, will move to New York headquarters to head this phase of the Institute's activities.

The glass container industry has joined with other industries interested in disposable containers to create an anti-litter publicity campaign, according to Secretary H. W. Kuni who represents G.C.M.I. in the group. The aim is a three- to five-year program of public education to eliminate the need for anti-litter laws which, in turn, could cut into sales of all single-use containers.

S. L. Rairdon, Owens-Illinois Glass Company, heads the Institute's committee to handle this educational phase of the anti-litter program.

Mr. Foster's report set the keynote for the session when he said, "the emphasis at this meeting is very definitely on our marketing problems". The importance of the current emphasis on marketing problems was underlined in Mr. Foster's report when he said that "a decline of even 5 per cent in volume would, under present operating conditions, put the industry in a considerable squeeze". He did not look for more than "a period of adjustment". Quoting a statement issued following a meeting of industrialists with Secretary of Commerce Weeks, he said one group felt the decline would be about 5 per cent between 1953 and 1954, while others put the drop between 8 and 10 per cent and still another group felt the business level would drop less than 5 per cent.

Despite this concern, 1953 shipments are expected to total about 119 million gross, Mr. Foster predicted, based on monthly reports through October. Such a year-end figure, Mr. Foster said, would bring 1953 shipments to 3 per cent over 1946, the previous record year, and 4 per cent over 1952. To achieve this shipment rate, the industry produced at a rate of 82 per cent of capacity. Total capacity now stands at 145 million gross, leaving about 18 per cent excess. In recent years, modernization has resulted in increased melting facilities, improved equipment and in a general increase of efficiency. Capacity has been upped 16 per cent since the end of 1946, Mr. Foster reported.

Approximately this rate of activity should continue next year, according to C. C. Merrifield, The Econometric Institute, Inc. He predicted the industry would ship at the rate of 119 million gross during the first half of 1954. He also said he expected shipments for the full year would run about 118 million gross, while the second and third quarters of 1954 should show better sales than those quarters of 1953.

On the over-all picture, Mr. Merrifield expects the first quarter of 1954 to reflect a slight fall-off from the first quarter of 1953. Lowered inventories will bolster glass demand for the latter quarters. Export volume will continue about at the 1953 rate.

Mr. Merrifield based his predictions chiefly on a slight decline in the Federal Reserve Board's index of industrial production. This now stands at about 226, while

(*Continued on page* 45)

Watching the Show on The Patio at The Lago Mar

Photos by Fred Chambers.

FIRE PREVENTION IN GLASS FORMING DEPARTMENTS

By E. J. SESTAK, Chief Engineer

Western Regional Office, Factory Insurance Assn., Chicago, Illinois

My comments are confined to fire prevention and protection problems applicable to bottle forming departments of the glass industry as differentiated from plate glass manufacture and other allied glass production. This is a subject that the insurance underwriters and their engineers have given particular study to during the past ten to fifteen years. Our concern and activity has been aroused by the mounting loss experienced in the major glass bottle industries throughout the country.

We have always regarded the glass bottle producers as one of our major industries, not only influencing our national well-being and economy, but also constituting an important underwriting segment of our work. As such, we have a moral obligation, not only as underwriters, but as engineers, to carefully study, catalog and analyze losses and loss potentialities in an effort to develop ways and means of eliminating or, at least, controlling fire hazards in this industry. This can only be properly done through the full cooperation of the industry and we are happy to say that it has been appreciated.

We have long recognized the fact that you cannot always stress or point to adverse loss experience for a particular industry on the basis of one or two unfortunate and freakish large losses. However, when the adverse experience is caused and results from numerous fires of a similar or related origin, it naturally becomes a matter that calls for some measure of study, correction, control or protection.

While we are on the subject of losses, our records show that the loss experience during the past ten years in some glass bottle plants has been approaching the 200 per cent point, and the average approaches the 100 per cent mark. This record is not composed of unusual and freakish mishaps, but a succession of related causes.

Specifically, this poor record was due to ignition of oily deposits in and around the bottle forming machines; ignition of the oily residue or condensate on the roof surface or sheathing and roof supporting members; and ignition of oily deposits on basement floors, ceilings and supporting members. The burnable media generally exposed to a fast travelling fire over a wide area or surface is the condensate from the oily vapors released from the paraffin oil spray for coating the bottle molds, and then there is the oily condition of the bottle machine itself.

When we consider that all conditions or factors needed to initiate a fire are present, namely open gas flame, molten glass hot enough to ignite the lubricating oil or paraffin molding oil employed, and oily deposits over a wide surface including equipment and building, we begin to realize that the elements that could initiate a fire are present. Thus the safety gap between fire potentiality and actual fire origin becomes extremely narrow.

When we superimpose on this picture an operation practically continuous under high heat, and of such a character that it makes cleaning extremely difficult, we find that the problem becomes an extremely difficult one that would discourage the ordinary individual. If we must resign ourselves to the fact that sooner or later we are apt to have a fire, then make sure it will be a little one and of no consequence.

Our records show nine common fire causes among fire causes at the bottle machine, extent of which are influenced by housekeeping maintained, or oily deposits present: (1) hot molten glass, escaping from mold, ignited oil on machine or floor; (2) oil deposit ignited on machine from a flash at machine, spreading up the air trunking and piping, igniting oil deposits on roof and roof supports, possibly due to over-heating; (3) oil deposit ignited on floor adjacent to bottling machine from hot glass gob, spreading to machine and roof; (4) hot glass from ruptured feeder ignited oil at machine that spread to structure; (5) open gas flame ignited oil at machine; (6) welding sparks at or near machine; (7) arc at electric conductor rails and resistors from overhead travelling crane ignited oil condensate; (8) electrical defects at machine and in basement below machine; (9) malformed bottle, molten glass contacting oil in basement below machine spreading to machine and then to structure.

During the past ten years, the underwriters have suggested a number of preventive and protective measures to the glass bottle industry, and we believe the industry individually has been making a genuine effort to improve conditions. However, as a general statement, we, in the fire protection engineering profession, feel that while some preventive and protective measures have been adopted, the industry has not gone far enough in both prevention and protection. We feel that the potentiality for a serious loss still prevails in many plants since cleaning methods or oil condensate spread control, as now practiced, are ineffective, and no effective means have been provided to quickly and efficiently extinguish a fire so as to reduce to a minimum extent of physical damage, as well as hold to a minimum the important aspect of business interruption. We recognize the enormity of the problem and the fact that we cannot act too hastily. Patience is a virtue in insurance circles.

As in all prevention and protection problems, sources of trouble in industry are first explored and attacked from the standpoint of eliminating or minimizing the cause, followed and backed up by fire control and extinguishment. We understand that several of the glass companies have experimented with and endeavored to use a non-combustible mold liquid, but that this, so far, has not apparently worked satisfactorily. While we don't know how extensive this research progressed, we would most sincerely promote continued effort in this direction if some element of encouragement exists.

During the past few years we experienced several disastrous fire losses from ruptured high pressure (1,000 to 3,000 pounds) oil lines on hydraulic die casting and forming machines. These machines worked in conjunction with an open flame furnace adjoining. This hazard is now being overcome to a large extent through the de-

Presented before the National Safety Council, Glass and Ceramics Section.

velopment and use of non-combustible and low hazard oils. This step forward in the name of safety came about even though there has been serious opposition to the switch-over. Many stated that they have tried and discarded the safer liquid, but finally went back to it.

Our next approach, still in the causative bracket, would be that of eliminating or controlling, insofar as it is practical, oil deposits or condensate on the machine, the over-head air trunking and piping and roof members, and thus reduce the fuel or fire spread in event of a flash fire at the machine. This, as now practiced in most plants, is done by hand wiping or swabbing, generally as far as the hand can reach, once or twice a week, or when the machine is shut down. It is only when the furnance is completely down for rebuilding that a thorough cleaning can be accomplished over that specific area through the use of portable steam and detergent spray cleaning machine methods. Since the life expectancy of a glass furnace is from two and one-half to three years, the time interval thus reduces the effectiveness of this thorough shut-down cleaning.

In addition, if adjacent furnaces are functioning, some restrictions hampering complete and effective cleaning of roof members also enters into the picture. We understand that some cleaning concerns have attempted cleaning roof members during operations but found out that the task is most difficult.

It would appear to us that hand wiping methods are not in keeping with other highly developed and efficient methods employed in the industry. It strikes us that steps toward minimizing the oily conditions resulting from the bottle machine have not kept abreast of improvements in other plant departments. Strangely enough, we have had superintendents and department heads of the forming department tell our men that they don't like conditions around the machines and feel that some measures could possibly be adopted to improve them. We have found the atmosphere around some of the bottle machines heavily charged with oil vapors.

The patented type of roof ventilators (such as the Robertson, Swartout and similar types), where properly installed, do a great deal of good in reducing oil condensate on roof members. They quickly channel vapor laden air to atmosphere through the medium of the up draft generated by hot air arising from the furnace arch, assisted by wind currents and directional dampers. This rapid air up-lift travelling a direct course to atmosphere helps to reduce condensate on roof and supporting members.

While no doubt there is a point or location where the patented ventilator gives the most effective air movement, we believe it is desirable to arrange and position the ventilators to quickly move the oil laden vapor as directly as possible to the exterior with minimum of condensate in the building and particularly on the roof over the glass furnace crown or arch. It appears to us that the patented ventilators could be positioned to direct the air currents to practically eliminate oil condensate over the furnace arch. If this could be accomplished, then the need and objection to sprinkler water reaching the furnace arch could be practically eliminated.

Properties with ordinary hip roofs generally have to resort to powerful ventilating fans to help clear the atmosphere or employ louvered openings in the roof monitors to dissipate the unwanted vapors or possibly a combination of both schemes. Wood roofs over bottle machines should be replaced with incombustible construction of proper design as soon as it is practical and economical to do so.

While we recognize the value of the patented metal ventilator and regular hand wiping and the major clean-up every two to three years, we frankly don't think that these features are the answer to the problem, as they cannot be fully counted upon to sufficiently reduce fire frequency nor serious physical damage or business interruption losses. The reason is that they do not reduce oil condensate to the level where a serious loss cannot occur. As a matter of fact, a serious loss did occur in properties where patented roofs were employed and apparently everything possible from a clean-up standpoint was being done within limitations imposed.

We have the feeling that there must be a more efficient scheme of catching the vapors at their very source without permitting them to dissipate into the building proper. That looks like a pretty strong statement. Let us cite a few examples of how other industries solved problems somewhat related in hazard. For example, oil quenching, while generally not so conducive to production of oily vapor, does cause an objectionable oily vapor discharge that has caused serious roof fires, even after the fire was extinguished in the quench tank.

These operations were generally conducted under incombustible roofs resulting eventually in an accumulation of oil deposit on the roof members. Oil vapor is generated when the red hot metal is introduced into the quenching oil and at times fire would travel up to the roof and cause a serious rapidly spreading roof fire in the oil condensate that many times resulted in distortion or collapse.

Upon application of effective hooding at the source, plus automatic fire extinguishment over the tank, in the hood and outside the hood, some years ago we were able to reduce a prolific fire breeder to one having a low loss level. With every bad fire, you are generally also faced with business interruption and this may be more serious than the fire.

It appears to us that the bottle machine itself, by reason of its exposed oily working parts, could possibly come under some careful study toward improving its design, and so reduce to a minimum the exposed oily surfaces and oily mechanism which contribute to the intensity, frequency and character of the fire. A number of years ago the cotton and starch industry did not think that enclosed machinery could be developed to reduce the hazard of fibers and dust, but this has now become a reality.

We realize that such features as noncombustible mold oil, condensate control at its source and improved machine design call for long range planning and development. Particularly in the case of the latter two, they will be probably confined to replacements or new plants.

We certainly are not trying to tell the glass forming industry how to run their business and the type of equipment to use, since that is entirely out of our sphere, but we do wish to stress causes and hope something can be done about it. The adverse fire record warrants careful study. We realize that this is a highly competitive business with a low margin of profit, depending upon volume. Drastic and costly changes come slowly. Rec-

ognizing major problems involved in minimizing losses through methods which more or less come in the long range bracket, we ask ourselves what can we do now that is both effective and economical; that will produce the greatest amount of good without interference with operations; and is, at the same time, practical?

We are faced with the prospect of a fire sooner or later. We certainly want to make sure we can reduce it to a small one. We believe we have the answer. We advocate the use of a fixed pipe water spray sprinkler over each individual machine, over the roof area exposed to condensate and in the basement areas below the machines where exposed to oil deposits. Within the last few years, water spray sprinklers have been developed which produce a finer water spray than the coarse and unevenly distributed droplets from the ordinary sprinkler. These spray sprinklers are either of the conventional type or the directional type. They offer efficient extinguishment and use a minimum of water through the use of finely divided water particles.

The protection for the bottle machine would, under present day facilities, be generally manual in operation, functioning at the discretion of the operator. Roof sprinklers should be of the automatic type with readily accessible shut-off valves.

It is apparent that each installation must be of a tailor-made job. We believe this important fact is sometimes overlooked by the prospective installer where experience may be limited to ordinary sprinklers and hose lines. Sprinklers, to fulfill their purpose to produce minimum loss and interruption, should be avoided over the furnace arch. But where examination clearly indicates that oil condensate is present in sufficient degree to require finely divided water spray over a limited part of the furnace, this could be developed and engineered to limit the finely divided spray to a minimum by control of orifice size. This still would not jeopardize effective extinguishment.

We realize that in the layout of roof sprinklers, every effort would be exerted to eliminate water reaching the furnace arch. Sprinkler sub-divisions can also be made through judicious use of control valves, with one or several systems controlling the area directly over the bottle machines, and a separately controlled system where the furnace arch would be involved. We have had a number of cases where sprinklers opened up over the arch of the furnace, did an effective job of extinguishing the fire and no damage of consequence resulted to the arch of the furnace. It is obvious that the damage to the furnace arch from solid or heavy hose streams can be a serious factor. We are thinking in terms of a finely divided water spray. When a fire occurs in the bottle machines, we hope that it can be extinguished by a portable extinguisher or portable hose line. If it spreads over the machine and gets beyond hand extinguisher control, then use of the fixed manual water spray should be employed. If fire spreads to the roof, either the fixed spray sprinklers provided will quickly extinguish the fire, or if no spray sprinklers exist, then hose streams will have to be employed.

There is no comparison between use of hose streams and fixed spray sprinklers. The latter can do the job quickly with a minimum of finely divided water that should cause minimum water damage or business interruption. No doubt, in many cases, just a short duration burst of finely divided water means extinguishment. A fixed pipe water spray system under the roof can do a much more efficient job than either the plant fire brigade, or the fire department using portable hose streams; or other portable extinguishing facilities.

Specifically, our recommendations for safeguarding bottle forming departments are as follows: (1) provide fixed pipe automatic spray sprinkler protection for all roof areas and ventilators where oily deposits can occur or where combustible construction exists; (2) provide manual fixed pipe water spray protection for the bottle machine; (3) install automatic sprinklers in basement below machine where oil is present; (4) provide hand hose connections with combination spray and solid stream nozzles and also portable extinguishers such as carbon dioxide and dry powder; (5) provide good room ventilation to help remove oily vapors before they condense; (6) reduce amount of oil used around forming machine to a minimum; (7) provide regular periodic cleaning of all roof trusses, supporting members and surfaces; (8) keep clean the forming machine, the air trunking and attachments; (9) all electrical devices and travelling cranes should be inspected periodically, kept in good repair and kept clean; (10) prohibit welding in this area.

We wish to reiterate that the adverse loss record is a challenge both to bottle forming industries and underwriters. We believe that improvements can be made toward a more effiective and efficient way of controlling oily vapor condensate at its point of origin.

Other industries have been plagued with the same problems, such as paint spraying, oil quenching, flow coating, dust producing operations, and so forth, and have eventually instituted effective control that not only made a safer plant, but a more efficient one. The patented type of incombustible roof ventilators have been of material help in reducing quantity and spread of oily condensate but the place to check the oil condensate is at its source. The exposed oily condition of the machines themselves, oil serving as a lubricant, offer considerable fuel to a potential fire. Perhaps some study could be made to improve this situation. Fortunately, the machines are of very rugged design and can withstand considerable heat and fire before serious damage is sustained.

Generally, the electrical controls are most vulnerable. A few plants already employ water spray sprinkler protection over the machines and the roof above the machines. We hope that others will follow in adopting this protection.

If a fire gets beyond the first aid hand unit stage and fixed protection is not provided, then hose streams will have to be resorted to. The latter presents a much greater hazard to the crown of the glass tank than do spray sprinklers or spray nozzles.

Not very long ago water spray protection was shunned for paint spraying and paint dipping and oil quenching operations, and for protection over electric transformers. Now it is accepted as dependable and effective protection. Water is an economical extinguishing agent generally of an unlimited character. Where properly applied, it appears to be best suited in controlling and leveling hazards that have spread beyond the first aid stage and involve space and areas of most bottle forming operations. For first aid application by portable means, effective uses

(*Continued on page* 43)

Inventions and Inventors

Feeding and Forming

Apparatus for Handling and Conveying Bottles. Fig. 1. Patent No. 2,653,713. Filed July 28, 1950. Issued September 29, 1953. Two sheets of drawings. Assigned to Irwin Swartzberg by Norman A. Siegal.

The principal object of the invention shown in Fig. 1 is to provide apparatus capable of transferring capped bottles, cans and articles composed at least in part of a magnetic substance from one conveyor system to another.

Extending upwardly from the support plate 45 (not shown), and supported by a strap 51, is a bar 52 of material which is magnetically permeable, such as for example low carbon steel. The bar 52 is positioned so that its edge portion 53 extends progressively across the path described by the cap 50 of the bottle 36. As the capped bottles 36 approach the bar 52, the metal caps touch said bar 52 diminishing to a substantial degree the magnetic attraction between the horseshoe magnets 32 and the attached caps 50 of the bottles 36.

Because the mass of the bar 52 is many times greater than that of the caps 50, which typically are made of thin gauge enameled iron, the magnetic attraction between the caps 50 and the magnets 32 is quickly diminished to the point where the capped bottles 36 drop off the magnets on to the conveyor belt 35. As the bottles 36 continue to move along the belt 35, the magnets 32 which carried them on to the belt 35 move away from the caps 50, as they move by the bar 52, out of magnetic range. To insure proper alignment of the capped bottles 36, as they are released from the magnet 32, a guide strap 54 is provided which contacts the central portions of the bottles 36, and guides said bottles along the belt 35.

The patent contains four claims and the following references were cited: 315,028, Hilder, April 7, 1885; 460,962, Gouyard Oct. 13, 1891; 960,668, Moore, June 7, 1910; 1,139,070, Phelps, May 11, 1915; and 2,503,467, Blind, Apr. 11, 1950.

Glass Feeder. Fig. 2. Patent No. 2,654,184. Filed April 21, 1949. Issued October 6, 1953. Five sheets of drawings. Assigned to Emhart Manufacturing Company by Karl E. Peiler.

An improved glass feeder is shown to be used with a Hartford-Empire type K forehearth. The feeder shown in Fig. 2 comprises a refractory glass discharge or feed bowl 1, which may be operatively joined to a refractory forehearth flow channel 2. The feed bowl has a tubular outlet member 4 in its bottom projecting upwardly into the glass above the level of the adjacent surface 5 of the feed bowl bottom in the form of an annular curb 6.

The casing 14 corresponds in shape to the feed bowl, being sufficiently larger than such bowl to be spaced as indicated at 15. The bottom of the bowl casing 14 is provided with an opening 18 within the annular seat 13 to accommodate an annular holder 19. The casing may swing vertically from its raised active position as shown in full lines in Fig. 2 to a lower retracted position as indicated by the dot-and-dash lines in the same view. The holder 19 carries a dish shaped holder 23 for an orifice ring 24. The combined outlet passages 7, 30 define the effective glass discharge or feed well of the feeder. The space 15 between the feed bowl and its casing may be filled with granular insulation as indicated at 34.

The novel arrangement of glass homogenizing and feed control elements of the feeder provides a commercially practicable separation of the three important functions of charge weight control, charge shape control and circulation of the glass in the bowl to effect thorough blending and equalization of temperature of all parts of the glass passing to the discharge orifice or orifices. This is accomplished without undesirable change of level of the glass locally at the front or some other place in the feed bowl. It also prevents accumulation of relatively colder, more viscous glass or stagnant glass on the floor of the bowl around the discharge passage or in a zone at the front of the bowl. Consequently, the glass fed downwardly through the feed orifice or orifices tends

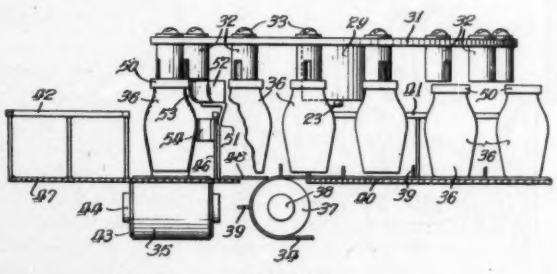


Fig. 1.

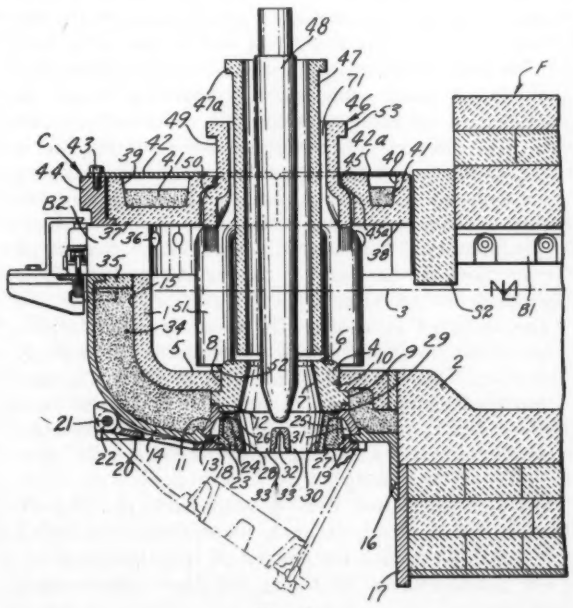


Fig. 2.

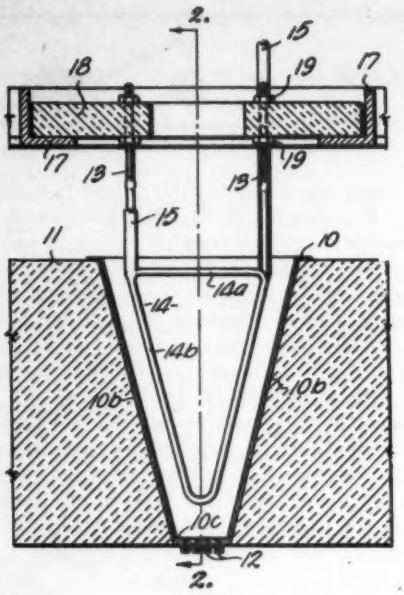


Fig. 3.

to be more uniform in temperature throughout its cross-section and to have less thickness of cold glass or "skin" on its periphery next to a glass discharge passage or orifice wall. Better distribution of temperature throughout the glass in the bowl also makes for a saving in fuel.

The patent contains 15 claims and 27 references were cited.

Glass Wool and Fiber

Immersion Heater for Glass Fiber Manufacture. Fig. 3. Patent No. 2,649,487. Filed July 27, 1949. Issued August 18, 1953. Two sheets of drawings. Assigned to Gustin-Bacon Manufacturing Company by Marion W. Phillips.

An improved method and apparatus for melting glass in the manufacture of fiber glass is shown in Fig. 3. The use of an immersion heater in the form of a catenary-shaped platinum wire is said to greatly improve the life of the normal platinum bushing and at the same time provide more uniform heating to the molten glass bath.

The glass retort comprises a trough-shaped unit 10 supported in an insulated setting 11, with vertical end walls 10a, downwardly converging side walls 10b and a horizontal bottom 10c. Suspended within the bushing upon a plurality of vertical hangers 13 is an immersion heater 14 of the grid type. It comprises a sinuous length of platinum alloy wire or rod shaped to the contour of the interior of the bushing to provide uniform heat throughout the glass body.

The preferred form of a grid heater is a helix of the shape shown in Fig. 3 made of platinum or platinum alloy wire. This helix comprises a series of convolutions of modified triangular shape with their horizontal base portions 14a uppermost and the side portions 14b converging downwardly substantially parallel to the side walls 10b of the bushing.

The addition of heat directly to the body of the glass batch is said to greatly facilitate the removal of occluded gases and thus reduce the amount of fiber breakage.

The patent contains 14 claims and 12 references were cited.

Processing Mineral Fibers. Fig. 4. Patent No. 2,653,355. Filed August 30, 1950. Issued September 29, 1953. One sheet of drawings. Assigned to Owens-Corning Fiberglas Corporation by Harold W. Essman.

A method is revealed for severing and conditioning strands of glass fibers especially where the control of strand and fiber orientation is essential.

Strands of fibers are first treated as shown in Fig. 4. As illustrated, the oven 16 through which the strands S are conveyed includes one or more series of heating devices 18 in the form of electrically energized heat lamps or jets of burning combustible mixture for establishing a zone of elevated temperature to fix or harden the adhesive. The strand severing means 22 is composed of a cylindrical roll provided with severing bars or knives 44 which are spaced at predetermined peripheral distances on the roll 22.

The roll 34, which is preferably in the form of a solid metal cylinder, is adapted to be superposed against the strand or strands S to urge the same into frictional engagement with the strand conveying means or roll 25.

The severed strands and fibers may be collected in a mat 75 or any desired manner dependent upon the particular purpose for which the severed materials are to be used. They may be immediately utilized to produce fibrous preforms or if a uniplanar fibrous mat is to be formed, the cut strands and fibers may be collected upon a suitable foraminous conveyor and a suitable binder or adhesive applied to insure mass integrity in the mat. It is highly desirable to effect a disintegration of the severed strands to separate individual fibers, groups of fibers or a combination thereof depending upon the purpose for which the collected fibrous mass is to be used.

The patent contains 14 claims and 13 references were cited.

Glass Fiber Drawing Device. Fig. 5. Patent No. 2,654,182. Filed May 11, 1951. Issued October 6, 1953. Three sheets of drawings. Assigned to International Harvester Company by Joseph F. Courtney and Adelbert C. Radtke.

This invention shows a novel method for attenuating glass fibers. Means are provided for grasping the fibers along an extensive length under light pressures with a continuous yieldable and preferably sinuous or curved surface whereby a positive drawing effect is achieved.

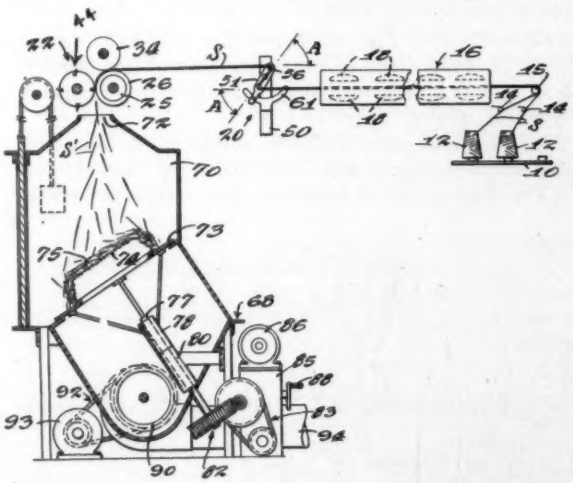


Fig. 4.

The drawing device 100, shown in Fig. 5, is flanked by a pair of dished, annular deflecting discs 126 and 128, each of which is preferably formed of sheet steel and comprises a depressed or dished central body portion 130 riveted to a hub 132 rotatably mounted on the associated stub axle 122 or 124 and retained thereon as by a nut 134 on the outer end of the axle. A generally radial flange 136 encircles the body portion 130 of each clamping disc.

The discs at their convergence have their radial flanges, which are preferably out-turned at their outer perimeters as at 138, pressed under predetermined light pressure against the outer side of the adjacent diaphragm. This action of both clamping discs effects a light, continuous and positive grasp through a flexible medium against the strand 140 which is entered into the gap 142 between the diaphragms 106, 106 upstream of the grasping area of the drawing assembly.

A friction drive for discs 126, 128 is obtained through engagement with the diaphragms. The axes of rotation of these discs converge towards shaft 114 in the plane of the surface of the drawing. However, to produce a sinuous effect, the axles 122 and 124 are disposed at different levels to obtain engagement of the flange of one disc slightly downstream of the other whereby the diaphragms and the strand are sinuated through the S-pattern grasping zone.

The stripping means is shown in a co-pending U.S. application Serial No. 221,596, filed April 18, 1951. The patent contains 16 claims and the following references were cited: 1,458,456, Young, June 12, 1923; 2,223,914, Karns, Dec. 3, 1940; 2,299,998, LeJeune, Oct. 27, 1942; 478,383, Great Britain, Jan. 18, 1938; and 512,283, Great Britain, Aug. 31 1949.

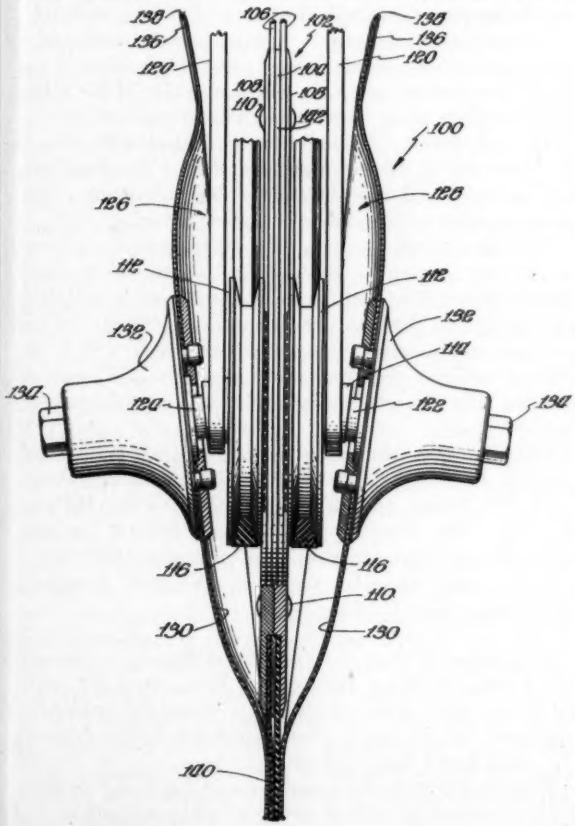


Fig. 5.

Miscellaneous Processes

Glass for Optical Dies and Punches. Patent No. 2,635-289. Filed November 16, 1945. Issued April 21, 1953. Nine sheets of drawings (none reproduced). Freeman H. Owens.

A novel use for glass is presented. Glass is used for dies and punches due to its superior surface. This invention in its broader aspects relates to method and means for producing efficiently and economically plastic lenses and other elements which have a high degree of precision and superficial finish.

Previous attempts to mold lenses from plastic materials have not resulted in lenses which have the excellence of a glass lens. A chief difficulty in the past has been that the dies which have been used have not created surfaces which have had the accuracy and the absolute smoothness which are required for the best optical results. The resulting surface is not optically accurate and acceptable because of the inherent limitations of the metal die.

The above difficulties have been overcome by the use of glass dies. Glass is tough, cohesive and hard. Its surface can be ground and polished so that it is perfectly smooth and accurate and this provides a superior surface for both die and punch. Synthetic resin of the methyl methacrylate group provide the following characteristics.

Index of refraction.....	1.45 to 1.50
Mean dispersion	0.0085
Dispersion power	0.0174
Light transmission	90 to 92%
(Visible range: not corrected)	
Specific gravity	1.18 to 1.20
Water absorption	0.2 to 0.3

The patent contains 33 claims and 29 references were given.

Method of Opacifying the Surface of Glass Articles. Patent No. 2,651,146. Filed May 16, 1952. Issued September 8, 1953. No drawings. Assigned to Corning Glass Works by Stanley Donald Stookey.

Improved photosensitive glasses have been developed employing silver as the primary photosensitizing agent. These glasses are less likely to deform and soften when thermally opacified at about 50 to 100°C. below the softening point ("A method for measuring the softening temperature of glass", J. T. Littleton, *Jour. Amer. Ceram. Soc.* 10, 259 (1927)). After heating, the glasses are exposed to short-wave radiations preferably between 3000 and 3500 Angstroms.

The glasses according to the present invention comprise essentially, on the oxide basis, 55% to 75% SiO_2, the indicated proportion of at least one alkali metal oxide selected from the group consisting of up to 2% Li_2O, 5% to 18% Na_2O and up to 13% K_2O, the selected alkali metal oxide including Na_2O, the total alkali metal oxide content being 12% to 18%, 2% to 12% Al_2O_3, 0.0001% to 0.3% of silver computed as AgCl, 0.005% to 0.05% CeO_2, 1.8% to 3.0% of analytically determined fluorine, and the indicated proportion of halogen selected from the group consisting of 0.01% to 0.2% of analytically determined chlorine, 0.02% to 0.4% of analytically determined bromine, and 0.03% to 0.6% of analytically

determined iodine. These essential constituents must amount to at least 85% of the total composition.

The latent image produced in the glass during exposure to short-wave radiation is converted to a visible opaque image by a two-stage development. The initial step involves heating the exposed glass for a time and at a temperature varying from about one minute at 50°C. above the softening point of the glass to about one hour at about 150°C. below the softening point.

Following such preliminary heat treatment, the glass is cooled to a temperature below about 500°C. During this step, also, no further visible change in the glass occurs. It is believed that submicroscopic nuclei of the opacifying agent or agents, that is, alkali metal fluorides, are formed on the silver nuclei as a result of this cooling, and that the formation of such invisible fluoride nuclei is entirely dependent upon the presence of the silver nuclei without which opacification of the latent image could not be initiated.

Having been so cooled, the glass is again heated at a temperature and for a time sufficient to cause the fluoride nuclei to grow and form opacifying crystallites. For this purpose the temperature should be not lower than about 100°C. below the softening point. For average image development, a period of 3 to 15 minutes is usually adequate. The finished glass is thereafter cooled to room temperature.

It is only during this second heating that the final opacified image is developed and then only in the irradiated portions of the glass.

The patent contains four claims and no references were cited.

Color Television Image Reproducing System. Fig. 6. Patent No. 2,646,462. Filed June 17, 1950. Issued July 21, 1953. Two sheets of drawings. Assigned to Radio Corporation of America by George C. Sziklai and Francis J. Darke, Jr.

This invention relates to television systems. It has particular reference to systems of the character embodying apparatus for reproducing an image substantially in its natural colors. An object of the invention is to provide a single cathode ray tube for reproducing color television images in a novel manner in a plurality of different component colors by means of a single electron beam.

In Fig. 6 there is illustrated schematically a color television cathode ray image-reproducing tube 1. The tube 1 includes an electron beam 12 producing means such as an electron gun. The electron gun consists of a cathode 3, a control electrode 5 which modifies the intensity of said beam and a focusing electrode 7. The tube 1 also includes two pairs of deflection plates 9 and 11 which deflect the electron beam 12 both in horizontal and vertical directions to scan a complete raster at a target electrode located in any plane at a predetermined focal distance from the electron gun.

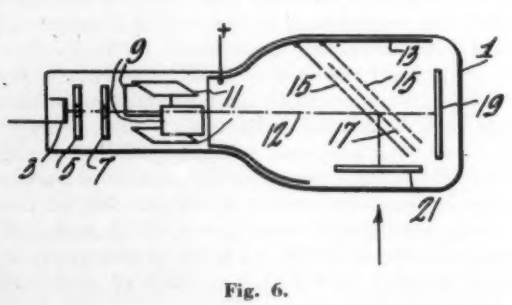


Fig. 6.

The electron beam 12 traverses a homogeneous field provided by a wall coating 13 on the inside of the tube 1 and a screen structure including a pair of spaced grids 15. These grids and the wall coating are connected to the same high positive potential source. The screen grids 15 are part of an electron mirror having additionally a center screen grid electrode 17. The range of potentials impressed upon the grid 17 is kept in the close neighborhood of the electron beam emitting cathode 3.

After the electron beam has passed the screen grids 15 and 17, either by transmission or reflection, it is a homogeneous field and is accelerated accordingly to the potentials of a pair of target electrodes such as luminescent screens 19 and 21. These electrodes function to translate the electron beam energy into visible radiation.

The patent contains 22 claims and the references cited were: 2,335,180, Goldsmith, Nov. 23, 1943; 2,521,010, Homrighous, Sept. 5, 1950; and 2,552,386, Sziklai, May 8, 1951.

Glass-to-Metal Seal. Patent No. 2,651,144. Filed November 15, 1950. Issued September 8, 1953. One sheet of drawings (none reproduced). Assigned to General Electric Company by Robert T. Foley and Herbert A. Omley.

The present invention relates to a glass-to-metal seal. More particularly, it is concerned with cast glass-metal seals, that is, seals obtained by casting a molten or softened body of glass into contact with the metal member and to an improved method of preparing such seals.

The novel arrangement comprises a metal part and a glass part having similar coefficients of expansion from room temperature up to the softening point of the glass, the two parts being joined by an intermediate layer of silver and indium. The latter layer is adapted to prevent the oxidation of the metal member during the glass casting operation and also to effect the desired wetting of the metal member by the molten or softened glass.

The metal part is preferably composed of an iron-nickel alloy containing 57 to 59% iron and 41 to 43% nickel. Silver plating of the metal is followed by a hydrogen anneal to enhance the silver-to-steel bond. Those portions of the silver plated member which will be in contact with the glass are provided with a thin layer of indium. The film of indium can be extremely thin about 3×10^{-5} inches.

The patent contains one claim and the references cited were as follows: 2,464,821, Ludwick, Mar. 22, 1949; 2,555,877, Doran, June 5, 1951; 359,014, Great Britain, Oct. 12, 1931; *Product Engineering*, "Indium Surface-Alloys Resist Corrosion and Wear", October 1943, pages 630-632; and *Scientific American*, "Versatile Indium", April 1944, pages 154-156.

Production of High Precision Glass Stopcocks. Patent No. 2,648,179. Filed January 10, 1952. Issued August 11, 1953. One sheet of drawings (none reproduced). Assigned United States Government by Milton Manes, J. E. Hofer and Robert D. Hinkel.

This invention is concerned with an improved method for the production of high precision glass stopcocks.

(*Continued on page* 46)

Research Digest

The Reactions Between Glass and Water

The corrosion of glass is of great theoretical and practical importance. Its general effects are met to a greater or lesser extent in all application of glass, and a very large proportion of the literature concerned with the study of the properties of glasses is devoted to this problem.

In cases of surface attack, water plays a very important role in the reaction. Any study which increases the knowledge of the attack of glass by water will give assistance in interpreting the effects of various solutions in contact with the glass surface.

Methods of testing a glass surface in contact with water may be developed either to examine the corrosion of a glass article or to test the fundamental nature of the glass mass. The reaction of a piece of glass is essentially the reaction of its surface and, hence, that surface must be as representative as possible of the whole. The "normal" glass surface may be affected by volatilization of alkali, diffusion of alkali from the mass or contact with acid gases during its forming and annealing. It may also be affected by various chemical agents, notably the atmosphere.

If it is desired to study the effect of changes of chemical composition of the glass on the rate of reaction with a view to extending the knowledge of glass structure, or to obtain a clearer insight into the reaction between glasses and water, it is essential to insure that the glass surface under test is truly characteristic of the glass mass. This may be accomplished by preparing the glass sample with freshly fractured surfaces; that is to say, as a powder.

In the tests usually described, the glass is placed in contact with a quantity of solution at the test temperature for a specified time after which the amount of reaction is estimated. Since the liquid in contact with the glass surface is not renewed, the products of the reaction remain in the solution and, hence, contaminate the reaction. It follows that as soon as any reaction has occurred, either the glass surface or the solution in contact with that surface will be affected by the products of reaction, either by adsorption or by solution. Thus, the reaction may be enhanced owing to the alkalinity of the liquid, or retarded owing to the adsorption of ions or molecules on the glass surface forming a "protective" layer.

The extent to which these effects are observed depends on the duration of the test, the ratio of the surface area of the glass under test to the volume of liquid used, the temperature of the reaction, the nature of the attacking medium employed and, naturally, on the type of glass which is being examined. If significant results are to be obtained, it is advisable to remove the products of reaction as quickly as they are formed. Only in this manner is it possible to test the glass in contact with a liquid of constant composition, no matter how long the test is prolonged.

Employing these ideas, a new method has been developed for the investigation of the reaction between glass and water and is described by I. R. Beattie in the October 1953 issue of the *Journal of the Society of Glass Technology*.

The apparatus proposed eliminates the objections which have been raised against the tests already described in the literature, since its fundamental principle is based on the fact that the glass is washed continuously by a liquid of constant pH throughout the whole of the test. A quantity of glass powder, of measured surface area, is placed in a reflux condensing system in which the condensate of distilled water flows through the bed of glass and sweeps out the products of reaction as fast as they are formed. No change in nature of the attacking medium occurs. Hence, there is no variation in adsorption effects or solution effects which are here due solely to distilled water. The variables of time and temperature remain as controllable factors, although in this method it is obviously most convenient initially to use 100° as the standard temperature. Tests have been carried out at other temperatures by varying the pressure inside the apparatus. This method has made possible a much more accurate and true comparison of the behavior of glasses in contact with water.

The apparatus which was originally used consists of a tube of approximately 1 meter in length, terminating at its lower end in a helix of narrower tubing enclosed in an outer jacket fitted with a ground joint by means of which a conical flask can be attached. The apparatus is made entirely of vitreous silica. A small silica crucible with a sintered silica base is suspended by platinum wires from three hooks at the end of the helix. An orifice in the wider tube, just above this coil and inside the jacket, allows vapor to pass into the larger condensing tube. The upper half of the longer tube is surrounded by a water jacket, making a condensing system, while the lower half is lagged down to the ground joint with asbestos. In operation, some 200 ml. of distilled water are boiled in the conical flask, the condensate percolating continuously through the bed of glass in the crucible.

Using a fine thermocouple, and also a fine differential thermocouple, measurements were carried out on the temperature of the water flowing from the spiral. The water was found to be within 0.1° of its boiling point. Barometric pressure changes affect the boiling point, but the maximum difference in temperature between any two tests was found to be less than 1°.

The essential feature of this method is that the liquid condensate in contact with the glass is free from any of the non-volatile impurities accumulating in the flask.

The glass to be examined is broken into pieces small enough to go into a steel percussion mortar in which it is crushed. The glass, after crushing, is sieved carefully between B.S.I. Nos. 16 and 25 sieves (orifices 1.003 and 0.599 mm.), allowing 5 minutes hand shaking. After removing any particles of iron which might be present, the glass is gently brushed to break down briquetted pieces which have such a large surface area that they would

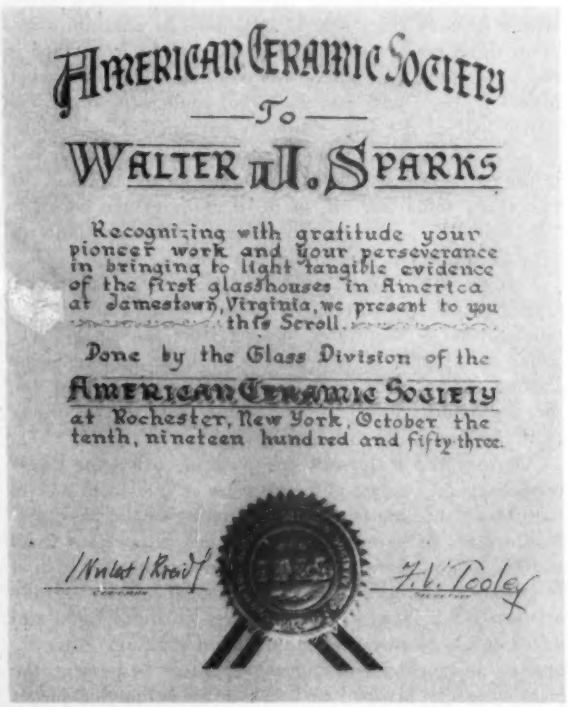
(*Continued on page* 40)

KNOX ELECTS OFFICERS

C. R. Deible was elected Executive Vice President of Knox Glass Bottle Company, Knox, Pa., and Knox Glass Bottle Company, Jackson, Mississippi, at a recent meeting of the Board of Directors. He was also designated as Chief Executive Officer of all the companies in the Knox group. Mr. Deible has been associated with the Knox companies in various capacities, principally operational, since 1931. He is a graduate of Carnegie Institute of Technology, School of Engineering, 1929.

C. Horton Smith was elected Senior Vice President and H. B. DeViney was elected Vice President of Knox Glass Bottle Company of Jackson, Mississippi, at the same time. For the past 18 years, C. Horton Smith has been the sales representative at New Orleans for that company. Mr. DeViney, who has also been associated with the same company as General Sales Manager for 19 years, will remain in that capacity with offices at Jackson. Divisional sales managers at that address are W. J. Henderson, S. L. Morgan and A. C. Stringer.

C. L. Rossman, who joined Knox in 1926, will continue as General Sales Manager for Knox Glass Associates, Inc., in Knox, Pa., directing sales for plants located at Knox, Marienville, Pa., Parker, Pa., and Gas City, Indiana. Divisional sales managers with offices located at Knox are J. T. Helsel, H. L. Kaness and W. F. McCall.


American Ceramic Society
To
Walter J. Sparks
Recognizing with gratitude your pioneer work and your perseverance in bringing to light tangible evidence of the first glasshouses in America at Jamestown, Virginia, we present to you this Scroll.
Done by the Glass Division of the
American Ceramic Society
at Rochester, New York, October the tenth, nineteen hundred and fifty-three.

Scroll presented to Dr. Walter J. Sparks in recognition of his early investigations of the first glasshouses in America.

WHEATON'S PLASTIC-COATED GLASS BOTTLE

In a recent paper delivered before the Chemical Specialties Manufacturing Association, Sett H. Adams of the Wheaton Plastics Company, a subsidiary of T. C. Wheaton Company, Millville, New Jersey, described the development and introduction of their plastic glass-lined aerosol container.

Referring to tests made on the tear strength of the plastic coating, Mr. Adams stated that it took over 1500 p.s.i. direct leverage before the coating could be ruptured or torn and its elongation percentage was above 250%. The coating will withstand steam sterilization at 18 pounds and dry heat sterilization at 100°C. It is non-inflammable, chars very slowly and only when the flame is in direct contact with the material.

Describing the neck finish of the glass bottle, it was pointed out that there is a secondary ring below the primary neck finish. The coating extends above the secondary ring to and under the primary finish so that when the valve aluminum seal is seated and crimped, a locking bead is formed between the secondary ring and the neck finish resulting in the secure bonding of the coating, valve and glass container.

In connection with the sealing mechanism for the new glass and plastic aerosol container, it was stated that many problems have confronted the valve manufacturers, but important progress has been made in this field. Some of the advances have made possible the packaging of many items in aerosol containers which previously could not be so packaged.

It was reported that exhaustive and conclusive drop tests of these coated bottles have been made using Freon at an approximate pressure of 25 p.s.i. at 70°F. The loaded bottles were dropped from a six-foot height onto a steel plate. In all cases, fragments of glass were retained within the protective coating, the propellant pressure being released through planned minute perforations. In these tests, rarely did a bottle break under nine drops and many bottles withstood as high as fifty drops without breaking.

For some time, specialty products such as waxes, moth-proofing, paints, glycol sprays, foam products and many others have been enjoying the aerosol field, but forever present is the problem of corrosion. Many products have been and are too corrosive in their action to be contained successfully in metal. However, the inert nature of glass should be the answer to the future packaging of all corrosive items. Glass will successfully resist the corrosive action of many products in the chemical, medicinal and toiletry fields.

FIRST INTERNATIONAL INSTRUMENT CONGRESS

The First International Instrument Congress and Exposition will be held in Philadelphia, Pa., from September 13 through 25, 1954. Laboratory apparatus and equipment, as well as measuring and control instruments of every kind, will be available for inspection and discussion.

The Instrument Society of America, in its capacity of organizer of the Congress and Exposition, has invited a large number of technical and scientific societies, both in the United States and elsewhere, to take an active part in the organization of the Congress.

Current Statistical Position of Glass

Employment and payrolls: Employment in the glass industry during October 1953 was as follows: *Flat Glass:* During October a preliminary 31,800 employment figure was reported. This is only .3 per cent below the adjusted 31,900 persons employed during September. *Glass and Glassware, Pressed and Blown:* A preliminary employment figure of 91,600 was reported indicating an increase of .9 per cent over the adjusted September figure of 90,700. *Glass Products Made of Purchased Glass:* During October, a preliminary 14,200 persons were employed. This is no change from September.

Payrolls during October 1953 were as follows: *Flat Glass:* A preliminary payroll figure of $13,249,470 was reported for October. This is 4.2 per cent higher than the adjusted $12,711,937 reported for September. *Glass and Glassware, Pressed and Blown:* During October 1953, a preliminary $27,328,860 was reported. This is .3 per cent higher than the adjusted payrolls for September of $27,237,210. *Glass Products Made of Purchased Glass:* A preliminary $3,774,455 was reported for October 1953. Compared with adjusted September payrolls of $3,645,235, an increase of 3.5 per cent is shown.

GLASS CONTAINER SHIPMENTS
(All Figures in Gross)

	November, 1953
Narrow Neck Containers	
Foods	736,355
Medicinal & Health Supplies	1,032,357
Chemicals, Household & Industrial	590,358
Beverages, Returnable	661,389
Beverages, Non-returnable	41,804
Beer, Returnable	99,792
Beer, Non-returnable	453,198
Liquors	957,267
Wines	351,191
Toiletries & Cosmetics	570,570
Sub-total (Narrow)	5,494,281
Wide Mouth Containers	
Foods	*2,453,051
Dairy Products	265,629
Medicinal & Health Supplies	295,790
Chemicals, Household & Industrial	107,124
Toiletries & Cosmetics	112,841
Packers' Tumblers	121,525
Sub-total (Wide)	3,355,960
Total Domestic	8,850,241
Export Shipments	299,797
TOTAL SHIPMENTS	9,150,038

* This figure includes Home Canning.

GLASS CONTAINER PRODUCTION AND INVENTORY
(All Figures in Gross)

		Production November 1953	Stocks November 1953
Foods; Medicinal & Health Supplies; Chemicals, Household & Industrial; Toiletries and Cosmetics	Narrow Neck	3,050,749	3,804,915
	Wide Mouth	*3,143,570	*3,701,506
Dairy Products		273,850	328,097
Beverages, Returnable		742,321	1,112,732
Beverages, Non-returnable		51,659	136,411
Beer, Returnable		180,144	213,497
Beer, Non-returnable		568,008	619,093
Liquors		1,042,907	883,296
Wines		402,245	375,378
Packers' Tumblers		146,482	213,459
TOTAL		9,621,935	11,388,384

* This figure includes Home Canning.

Glass container production, based on figures released by the Bureau of Census, dropped 13.2 per cent during the month of November 1953 to reach 9,621,935 gross. This is a drop from the previous month's 11,088,226 gross. During November 1952, a total of 8,888,046 gross were produced, which is 8.2 per cent less than for November 1953. At the end of the first 11 months of 1953, glass container manufacturers have produced a total of 114,131,933 gross. Compared with the 107,380,971 gross produced during the corresponding period in 1952, a rise of 6.2 per cent is indicated.

Shipments of glass containers during November 1953 also fell off and were reported to be 9,150,038 gross. This is a 12.9 per cent drop from the 10,513,770 gross shipped during October. Shipments during November 1952 were 8,545,981 gross, which is 7 per cent less than shipped during November 1953. During the January-November 1953 period, a total of 111,835,110 gross of glass containers have been shipped. Compared with the 106,028,950 gross shipped during the January-November 1952 period, a difference of 5.4 per cent is shown.

Stocks on hand at the close of November 1953 were 11,388,384 gross. This is 3.5 per cent above the 10,995,584 gross on hand at the end of October and 12.9 per cent above the 10,086,751 gross on hand at the end of November 1952.

Automatic tumbler production during October 1953 rose 13.2 per cent to reach 5,449,722 dozens. This is an increase over the previous month's 4,810,498 dozens. During October 1952, a total of 5,696,134 dozens were produced. Shipments of automatic tumblers during October 1953 were 5,716,071 dozens. This is 19.4 per cent over the September shipments of 4,785,245 dozens. During October 1952, shipments were 6,012,130 dozens. Stocks on hand at the close of October 1953 were 10,266,894 dozens, or 1.9 per cent higher than the 10,075,102 dozens on hand at the end of September. Stocks on hand at the end of October 1952 were 8,034,823 dozens.

Table, kitchen and household glassware: Manufacturers' sales of machine-made table, kitchen and household glassware fell off 1.7 per cent during October 1953 to reach 3,725,206 dozens. This is a drop from September sales of 3,792,654 dozens. During October 1952, sales were 4,374,327 dozens. At the end of the 12-month period ending October 1953, manufacturers had sold a total of 41,268,000 dozens. This is 2.8 per cent higher than the 40,133,501 dozens sold during the corresponding period ending October 1952.

FERRO COMPLETES PERFECT SAFETY YEAR

With the Award of Honor flag for an outstanding safety record currently flying over Ferro Corporation's plant at Cleveland, Ohio, C. D. Clawson, President, has announced completion of an entire year of operations without a single lost-time accident.

Mr. Clawson revealed that in July the National Safety Council presented Ferro with the "Best in Industry" Award of Honor for a safety record considerably better than the norm for the company's industry group. Now, at the end of 365 operating days comprising 1,277,937 man-hours with no accident-caused lost time, Ferro has presented inscribed ball-point pens to all company employees in appreciation of their cooperation towards achieving the perfect safety record. The inscription reads, "Ferro Corp., Cleveland Plant. One year of operation without a disabling accident, 1953."

A.S.T.M. COMMITTEE C-14 ACTIVITIES

New procedures for inclusion in the chemical analysis of glass sand are being completed by Committee C-14 covering the determination of lime and magnesia.

In studying chemical properties, specifications for water are being considered for use in the glass durability test. Proposed methods dealing with physical and mechanical properties of glass being studied are the measurement of softening, strain, annealing points and the expansion of glass. A separate study is being made of flexure testing of glass.

Revisions are underway which will modify the Tentative Method of Sampling Glass Containers (C 224) and the glossary of glass terms (C 162).

BAUSCH & LOMB ACQUIRES SOUTHEASTERN OPTICAL

The merger of Southeastern Optical Company of Richmond, Virginia, an affiliated distributor since 1929, has been announced by Bausch & Lomb Optical Company. The Southeastern company has 31 branch offices and eyeglass prescription laboratories in eight states from Virginia to Florida. Headquarters are at Richmond and other district offices are located at Atlanta and Chattanooga.

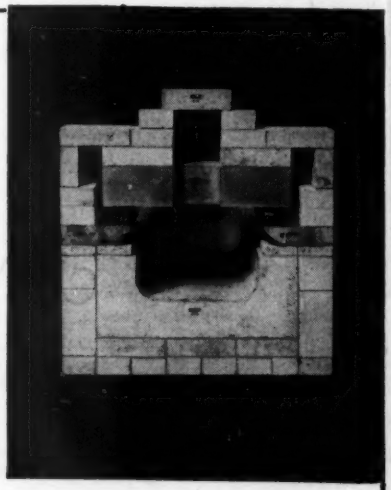
Announcement of the consolidation, which became effective January 1, 1954, was made by Joseph F. Taylor, President of Bausch & Lomb. Walter S. Galeski, President and founder of Southeastern, has been appointed Manager of the new sales and service organization which will be known as Bausch & Lomb Optical Company, Southeastern Division. District managers are Donald L. Sims, Richmond; Albert T. Vannerson, Atlanta; and W. John Quinton, Chattanooga.

With the addition of Southeastern, Bausch & Lomb will have 161 ophthalmic branch offices and prescription laboratories from coast to coast.

• Dr. Eunice P. Garrett has recently succeeded Carolyn Donahey as Technical Librarian for the Research and Development Laboratories at Foote Mineral Company. Dr. Garrett is a graduate of the University of Minnesota with a Doctor's Degree in Geology, as well as an M.S. degree in Library Science.

Cleaner Glass, Low Maintenance

with **CRYSTALITE Forehearths**



REMMEY CRYSTALITE (mullite-bonded mullite) is produced in all shapes necessary to make up the forehearth assembly. Burner blocks, cover blocks, channels, spouts, tubes, plungers and orifice rings are built to meet specified requirements. These CRYSTALITE parts mean better, more efficient production by offering:

★ Accuracy in formation to eliminate time-wasting adjustments.
★ High refractoriness and erosion resistance for longer life, fewer replacement shutdowns and cleaner glass.
★ Rigid control through each production phase for uniform quality and dimension accuracy.

Get Premium Performance Without Premium Price . . . by using REMMEY CRYSTALITE parts for your forehearth.

Dependable Refractories

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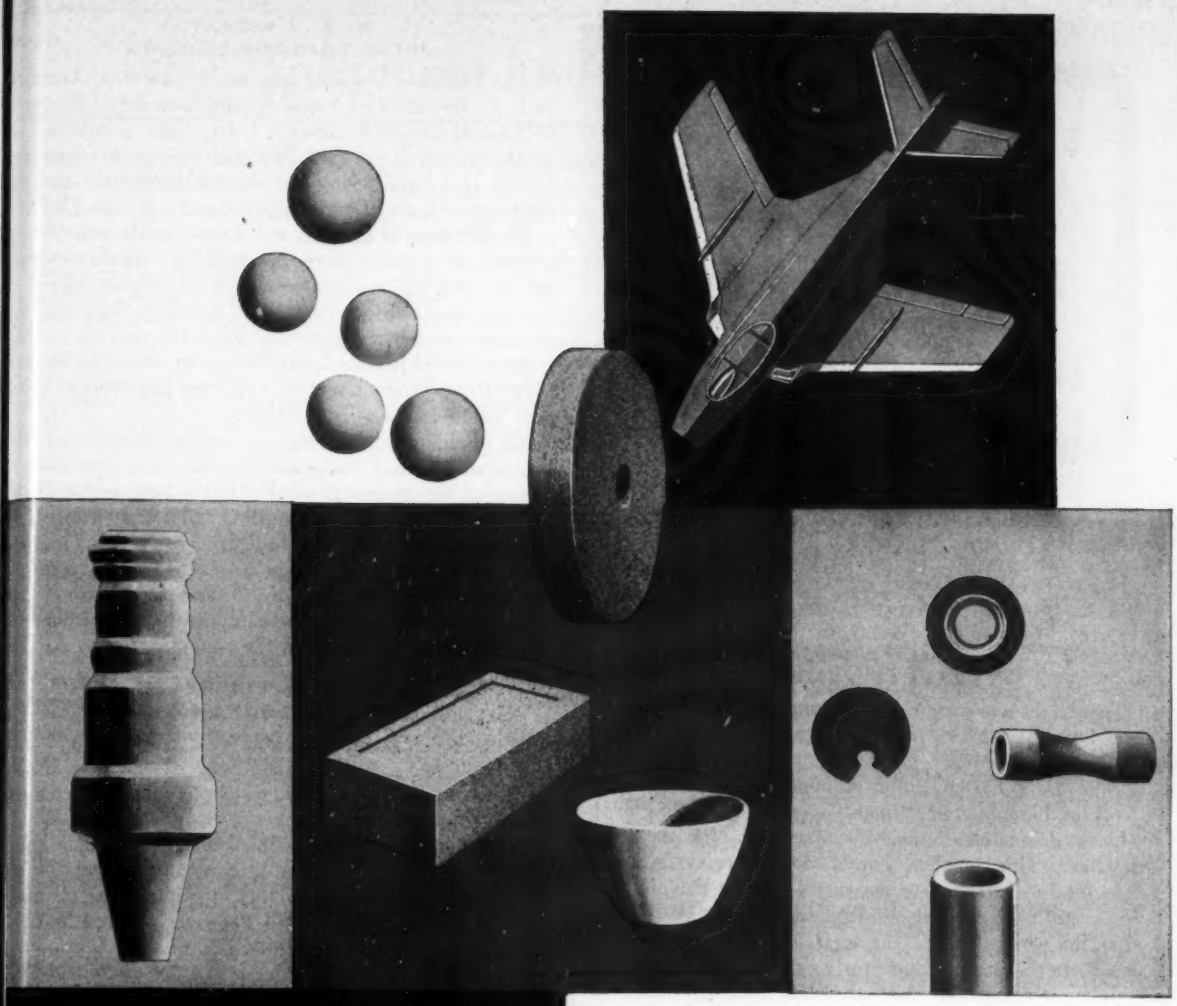

Are Alcoa Aluminas in your success story?

It only takes a little imagination about ALCOA Aluminas to write ceramic success stories today, as scores of manufacturers have proved recently.

For example, the development of the jet engine was substantially aided by aluminum oxide insulators. Ordinary insulators simply couldn't take the heat.

Ceramic pump parts and pipe linings of 85-95 per cent alumina provide such good abrasion resistance that they are used where once even strong metals failed. Used as a filler, alumina adds strength to synthetic resin dies for forming steel parts. Ceramic thread guides have set new performance records.

Other examples of products which have been measurably improved by the addition of ALCOA Alumina include: refractory brick, laboratory ware, grinding balls, electrical insulators, glassware, enamels, glazes, ceramic tile, bearings and concrete.

Alumina ceramics now serve in applications unheard of a few years ago . . . have helped to build whole new industries. Why not let them write a success story for *you?* Maybe we can show you how. Write to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 713-A Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA CHEMICALS

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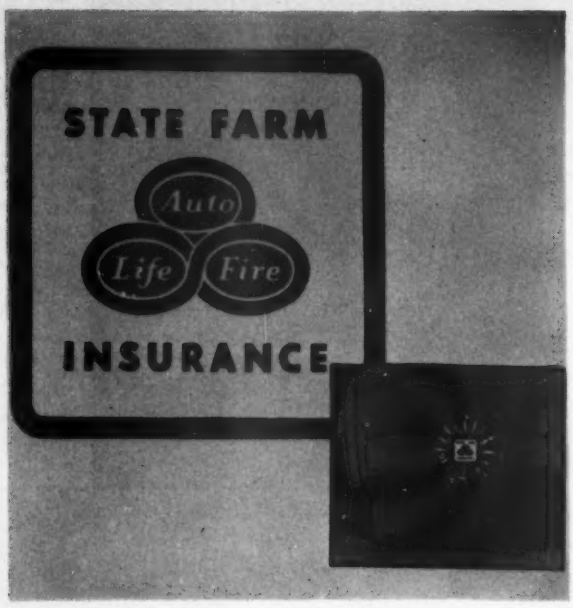


NEW LIGHT-REFLECTING SAFETY SYMBOL

A new light-reflecting safety symbol that instantly identifies a careful driver is finding its place on the nation's highways.

The State Farm Mutual Automobile Insurance Company of Bloomington, Illinois, is currently making available a distinctive bumper decal emblem for its policy holders. This emblem has a Scotchlite surface that provides an extra safety measure for night driving since it is said to have reflecting qualities 175 times greater than the whitest paint. The surface gleams as it picks up headlight beams of following cars. Distribution of the emblem is being made by State Farm agents in their communities.

The Meyercord Company, which designed and produced the decal bumper emblem, states that this is the largest order of its kind ever placed by one buyer and produced by a single decal manufacturer.

VITRO CORPORATIONS MERGE

Shareholders of The Vitro Manufacturing Company ratified a plan of merger and reorganization at a special meeting, according to an announcement by J. Carlton Ward, Jr., President. The parent corporation and its two subsidiaries, Vitro Corporation of America and Vitro Chemical Company, will merge into one corporation.

The merged corporation will be known as Vitro Corporation of America, with offices in New York, and will include five divisions or operating units. It will retain the same capital structure, directors and officers.

The resulting divisions of the corporation will be Vitro Manufacturing Company, Pittsburgh, Pa., makers of ceramic colors and chemical products; Vitro Uranium Company, Salt Lake City, Utah, processors of uranium ore; Canonsburg Rare Metals Company, Canonsburg, Pa., engaged in the refining and recovery of metals; Vitro Laboratories, Silver Spring, Md., and West Orange, N. J., engaged in research and development; and Vitro Engineering Division, New York, N. Y., providing engineering, design and construction management services.

W. L. FABIANIC JOINS LACLEDE-CHRISTY

W. L. Fabianic has been appointed Executive Assistant to L. C. Hewitt, Vice President and Director of Research at Laclede-Christy Company, it has been announced by J. D. Streett, President. Mr. Fabianic will assist Mr. Hewitt in administering the Research Division, and the company's Quality Control Department will report to him.

Mr. Fabianic is not only well known in the refractories industry in general, but is an authority on refractories per se. Having received a Master of Science degree in Ceramic Engineering from North Carolina State College, he taught ceramic engineering there for two years, later joining Owens-Illinois Glass Company, where he became Chief Refractories Engineer. He has just resigned that position to join Laclede-Christy.

Mr. Fabianic has been an active member of the American Ceramic Society since 1928, and was made a Fellow of the Society in 1944. He has been active in the work of the A.S.T.M. since 1935, and is at present an advisory member of their Industrial Survey Committee. He is the author of numerous papers on refractories, and has conducted a series of tests and development work in various refractory fields with nearly all the leading refractory manufacturers in the country.

PENNSYLVANIA STATE COLLEGE RENAMED

Announcement has been made that The Pennsylvania State College, which in 1955 will observe the 100th anniversary of its founding, has been formally renamed The Pennsylvania State University.

This change marked the third change in name since Penn State was founded in 1855 as the Farmers' High School of Pennsylvania. In 1862, the name was changed to the Agricultural College of Pennsylvania and in 1874 to The Pennsylvania State College.

J. GORDON KING RESIGNS FROM O-I, JOINS PLAX

J. Gordon King has resigned as Vice President of Owens-Illinois Glass Company and General Manager of its Kaylo Division to become Vice President in charge of Manufacturing for the Plax Corporation.

Mr. King has been General Manager of the Kaylo Division for the past year and a half. He joined the General Manufacturing Division of Owens-Illinois in 1932 and three years later was made chief engineer of the company's Pacific Coast Division in San Francisco. In 1940 he returned to the general offices in Toledo as Manager of the Production Control Department.

He served in World War II as a Commander in the U. S. Naval Reserve and was assigned to run properties operating under Government seizure orders. Following his discharge, he returned to Owens-Illinois and in 1948 was elected Vice President of the company and Manager of glass container production. Mr. King will make his headquarters in Hartford, Connecticut.

• A group of 14 leading industrialists will serve as a board of sponsors for the second Basic Materials Exposition, the product development show, which will be held at the International Amphitheatre, Chicago, May 17 to 20. Don G. Mitchell, Chairman of the Board of Sylvania Electric Products, Inc., is Chairman of the sponsoring board.

New Equipment and Supplies

COMBINATION PALLET, DRUM AND BOX HANDLER

Yale & Towne Manufacturing Company, Philadelphia, Pa., has developed a newly-designed combination pallet, drum and box handler, increasing fork truck versatility and widening the scope of the truck's handling activities.

Lever controls enable the operator to vary fork spread hydraulically between 18-inch minimum and 62-inch maximum centers. This arrangement makes possible the handling of a wide variety of pallet sizes. Many different load types may also be handled because of the squeeze action afforded by this versatile design feature.

Special purpose jaws can easily be slipped on and secured to the forks, adapting the truck for handling box or carton loads within the range of the fork spread.

S-A ENCLOSED ROLLER TYPE HOLD-BACK

Stephens Adamson Mfg. Company, Standard Products Division, Aurora, Illinois, has designed an enclosed roller type hold-back to prevent reversal of bucket elevators and inclined conveyors due to power failure under load. It consists of an inner member with wedge pockets for six hardened rollers which rotates with the shaft. When the shaft attempts to reverse, the rollers wedge against an outer cylinder. Pressure springs and plungers guarantee instant engagement of the rollers. The hold-back releases instantly when forward motion of the shaft is resumed.

The hold-back mounts directly on the drive shaft, with the torque arm bolted to a support with sufficient strength to resist the load exerted when reversal occurs. Maximum torque resistance ranges up to 350,000 inch pounds for units with a maximum bore of seven inches.

WET BLASTING MACHINE

American Wheelabrator and Equipment Corporation, 1026 South Byrkit Street, Mishawaka, Indiana, has announced its new Model 30 Liquamatte wet blasting machine. The Model 30 is designed for all sorts of precision cleaning and finishing operations involving small parts which can be lifted and handled manually, and which are capable of going through a door opening 22½" x 19".

Some typical applications for the machine are fine deburring, blending grinding lines, finishing and redressing in the manufacturing and maintenance of glass, plastic and the smaller rubber molds, prolonging cutting tool life, reconditioning plant equipment such as oil burners, cleaning oxides from tungsten carbide tips before brazing them to cutting tools, etc.

DECORATOR PRESS

General Research & Supply Company, 572 South Division Avenue, Grand Rapids 3, Michigan, has announced a new decorator press for screen process printing on rigid sheet materials.

The General decorator press will handle rigid sheets ranging from 8" x 12" to 12" x 25" in size and .010 to ⅝" in thickness. Models with a larger sheet capacity will be available at a later date. The speed range is from 1,000 sheets to 2,000 sheets per hour. The press can be fed either by hand from an automatic stock lift or by a conveyor system. The printed sheet is delivered by tapes for the drying operation.

NEW UNIT TYPE DUST COLLECTOR

Pangborn Corporation, Hagerstown, Maryland, has announced a new unit-type CN cloth bag collector designed for economical and efficient dust collection for smaller volume applications. Each unit is self-contained and shipped assembled ready for installation.

The collector is designed for indoor use and cleaned air can frequently be discharged inside the plant. Finely divided dusts are collected through cloth filter bags similar to the large Pangborn type CM dust collector.

Dust laden air enters the collector where it is expanded in a settling chamber. Here, the reduction in velocity drops coarser dust particles directly into the hopper. A baffle plate prevents the air from rising immediately to the cloth bags and, therefore, the only escape for air is through the open bottom of the bags. This air then flows into the bags where the fine dust particles are filtered on the bags' inner surfaces. Cleaned air passes through the bags and is discharged from the collector. Air flow through the collector can be shut off whenever necessary and the bags mechanically shaken to remove dust from their inner surfaces. This dust falls directly into the hopper for removal and disposal.

HIGH-VOLUME BLOWER

Standard Electric Mfg. Company, Inc., West Berlin 12, New Jersey, is offering a large capacity blower (6-inch wheel) for quick removal of fumes, smoke and stale air or for cooling and ventilating.

Moving up to 600 cubic feet of air per minute, the blower features an automatic cut-out which stops the completely enclosed 110-volt, 60 cycle motor before it can overheat.

CATALOGS RECEIVED

Automatic Transportation Company, 149 West 87th Street, Chicago 20, Illinois, has issued three bulletins covering the "Transveyor Stacker," riding-type electric industrial truck especially designed for close-quarter narrow-aisle operation.

The four-page brochures contain complete specifications for the 2,000, 3,000, and 4,000-pound capacity trucks in the Transveyor Stacker series.

Rapids-Standard Company, Inc., 342 Rapistan Building, Dept. GC, Grand Rapids 2, Michigan, has made available a new 16-page illustrated catalog of Rapistan conveying equipment.

The new 2-color catalog has photos, specifications and application suggestions on the complete Rapistan line of portable and permanent-type belt units, gravity wheel and roller conveyors in steel and lightweight aluminum, and industrial casters and hand trucks for a wide range of handling jobs.

The catalog also explains and graphically shows how the conveying equipment can be used as separate units, or combined in a variety of ways to fit individual handling problems. Included is a listing of available case-history reports on use of the equipment by many types of industrial, retail and wholesale firms.

Air Reduction Sales Company, 60 East 42nd Street, New York 17, New York, is offering a new 12-page reprint, "Stranded Materials for Airomatic Welding", reprinted from the *Welding Journal.* The article discusses the use of stranded wires in the inert-gas-shielded metal-arc consumable electrode Airomatic welding process.

Some of the points covered include construction of stranded electrodes, with close-up photographs showing the wires are interwoven; welding characteristics of a stranded electrodes, with photomicrographs of deposits; and case history applications complete with illustrations showing where stranded electrodes have been used with success.

The Bristol Company, Bristol News Service, Waterbury 20, Conn., has published a new bulletin describing a metal-ceramic thermocouple well. The bulletin outlines all properties and specifications of the new protection tube, which combines the thermal conductivity and shock resistance of metal with the corrosion and deformation resistance of ceramics. The wall of the tube has the same thermal conductivity as cast iron, and although it is only ⅛-inch thick, only single wall construction is needed.

The four-page, illustrated bulletin, No. P1261, gives complete physical properties, dimensions and catalog order numbers.

CALUMITE

is here to stay

It was not very long ago that there was no batch material called Calumite . . . Today it is the accepted batch ingredient for the manufacture of amber and colored glassware.

Why is Calumite here to stay?

Because its efficiency and economy have been proven in actual production . . .

What specifically does it offer?

A low cost source of alumina, easier melting, better glass quality, uniformity and positive control over quality since it affords a method of mathematical approach to glassmaking.

In short, Calumite is here to stay because it increases profits in two ways — sales are increased through better quality of ware and it lowers production costs.

It will do these things for you.

Write for details now.

The Calumite *Co.*
HAMILTON, OHIO

ADVANCES IN "BRIGHT" PRECIOUS METALS TO EXPAND PACKAGING FIELD

Technological advances in "bright" precious metal preparations and in their application by screen printing on glass and ceramics have opened new vistas in the packaging field, it has been reported by the Ceramic Division of Hanovia Chemical & Manufacturing Company, a member of the Engelhard Industries group.

Cited as examples of the new technique are the gold-decorated decanters in which several of the leading whiskies are now bottled. Of 22 carat gold, these decorations fire out with a gold mirror finish and retain their original brilliance indefinitely. The metal film is fused to the glass and resists abrasion.

Other preparations in the new series are bright platinum and bright palladium, and all three are applicable to both clear and opal glass containers, as well as to glass specialties and to ceramics. They are establishing markets in the packaging of beverages, in addition to their preferred position in the glass tableware and cosmetic fields, the company states.

The success of these new decorative materials, which are known as squeegee preparations, rests on two basic developments, according to the company's statement. The first is the vehicle for carrying the bright gold or other precious metal; the second is the special type of silk screen used in applying the decorative pattern. The vehicle is of a consistency which insures sharp prints, and of a material that is burned off completely in the firing, leaving a mirror-like deposit of the precious metal. Hanovia stocks a special silk for gold screening which it feels is vital to a successful print.

These squeegee preparations have been developed for application in hand or automatic screen printing machines operating at rates as high as 50 prints per minute. Their consistency is such that 100 grams will cover a pattern area of approximately 30 square feet when screen-printed, the company says. Despite the high karatage of the precious metal films, the actual gold cost often runs less than one cent per print.

KAISER ALUMINUM STAFF CHANGES

Two appointments on the Chemical Division sales staff of Kaiser Aluminum & Chemical Sales, Inc., have been announced by Frank M. Cashin, Division Manager.

John B. Minshall has been named product specialist with headquarters in the Division's Akron, Ohio, office. He has been with the company since 1941, and prior to his recent appointment was senior sales representative for Northern California. Mr. Minshall is an alumnus of the University of California.

Carl A. Snider is the new sales representative for Northern California, transferring from the production planning department at the Division's basic refractories plant at Moss Landing, California. His office will be in the Kaiser Building, Oakland.

• Dr. Alexander Silverman, Professor of Chemistry, Emeritus, in the University of Pittsburgh, addressed the Glass Division of the Southern California Section of the American Ceramic Society on "1953 Summer Tour of the European Glass Industry". Dr. Silverman visited glass factories in France, Holland, Denmark, Sweden and Norway.

Products of fame

wherever there's flame...

Keeping flame on the job is the business of brick. Refractory brick to contain the flame and put it to work with efficiency and economy in the furnaces of industry.

Grefco refractory products have long been famed for doing this job reliably. Grefco brick, special shapes, mortars, plastics and castables to hold the heat and help spew out products for the service of industry.

If your operation requires *flame*, here's the name . . . *Grefco!*

A Complete Refractories Service . . .

GREFCO

GENERAL REFRACTORIES COMPANY
Philadelphia

GENERAL REFRACTORIES COMPANY

CONFERENCE ON GLASS PROBLEMS . . .

(*Continued from page* 18)

total impurities are less than one per cent.

A typical analysis of a desirable dolomite was given as follows:

SiO_2	0.22%
Fe_2O_3	0.053
Al_2O_3	0.11
$CaCO_3$	54.59
$MgCO_3$	44.96
SO_3	0.032
P_2O_5	0.002

M. H. Pickard, Pacific Coast Borax Company, spoke on "Borates for the Glass Industry". The domestic borate deposits are practically all located in the State of California. The exact locations are at Boron, Shoshone, Searles Lake and Owens Lake. The sodium borate minerals found here are tincal, the decahydrate form of sodium tetraborate, and rasorite, the quadrihydrate of the tetraborate.

Owing to the nature of the deposits, the recovery processes are entirely different. The two methods most frequently used are (1) shrinkage stope and (2) the room and pillar method. After the ore is mined at Boron or Shoshone, it is crushed, screened, calcined and fused to give anhydrous rasorite concentrates. The fused material is stored or loaded for direct shipment.

The treatment of the brines taken from Searles and Owens Lake utilizes an entirely different process. Owing to the complex composition of these brines which contain in addition to borax-sodium chloride, sodium sulfate, potassium chloride, sodium carbonate, as well as other soluble salts, a considerable amount of the brine must be removed by evaporation before crystallization of the different salts can be effected. Once this borax has been refined, its conversion to an anhydrous form is basically the same as has been previously described.

Approximately 20% to 25% of the annual domestic production of B_2O_3 is used in the manufacture of various types of glass. Another 20% to 25% of the borates produced is consumed by the vitreous enamel and glaze manufacturing; based on total tonnage of 583,828 produced in 1952, as reported by the Bureau of Mines, it is estimated that for that year 233,531 tons were used in the glass and ceramic industries.

During the past few years, some of the minor impurities contained in some borates have been reduced and anhydrous borax has become available in two additional mesh or screen sizes.

"Balanced Packaging of Glass Containers" by R. O. Spalding, Owens-Illinois Glass Company, produced some startling and positive evidence to indicate that the design and construction of container cartons were highly important to the safe shipment of glass containers. The use of too much paper is possible, and it was shown that a container with double thicknesses on the outside and only single thicknesses in the inner partitions usually produced failure or breakage within the package and not on the outside layers. It was found that less breakage occurred when the package was balanced or uniformly supported; that is, the strength or thicknesses of the inner partitions are the same as the outer. This type of improved carton utilized less paper and was more economical. Many railway regulations have been rewritten on this basis and have been accepted with encouraging and improved results.

In his paper, "Safe Load Impacts", Henry E. Walker, Harding Glass Company, described an unusually practical test. This test was designed to indicate how much impact a window glass product would withstand for safe delivery.

In cooperation with railroads, trucking companies and other shipping concerns, loaded boxcars were bumped at various speeds into loaded coal cars to produce impacts similar to that encountered in rough handling in shipment. The cars were loaded with conventional window glass boxes and various methods of loading, blocking, gating and supporting were used. The impacts were accomplished by movements of 3-10 miles per hour at impact, and a thorough study of the contents after crashing revealed many good and bad methods of loading.

The impacts as studied did not produce much broken glass but did show considerable package failure. Each study was supported by the use of impact recorders mounted on the wall of the car. These recorders have been found useful for customer satisfaction and complete cooperation of the carrier has been obtained with their use.

It was found that, generally speaking, one severe or heavy impact would produce more damage than a series of lighter impacts. Severest damage usually occurred at the ends of the car. The tests were of definite practical significance and should serve as a means of creating better understanding between shipper and carrier.

"Evaluation of Carloading Methods and Packages by Split Load Shipments" was presented by John G. Turk, Glass Container Manufacturers Institute. The Institute has produced a remarkable amount of evidence of value to improved carloading and shipping technique. It was emphasized by Mr. Turk that complete data and many conforming tests should be run before any conclusions are drawn. Car surveys were made from 1947 to 1953 involving inspections of 140 to 159 cars each year.

The surveys indicated that horizontal impact along the direction of the longer length of the car produced the most damage. Crushing at impact always produces a void at the opposite end of the car. This condition is reversed when the car is impacted at the opposite end. Sway or sidewise movement of the car is also involved.

Material aids in loading were suggested: (1) end wall cushioning by corrugated sheets or retaining paper; (2) floor coverings; (3) doorway protection; (4) block loading plan in which the containers were staggered lengthwise; crosswise stowing and the use of dummy boxes was practiced. Each method is designed to offset lengthwise horizontal force.

Split loading, in which "A" method is superimposed on "B" method at one end and the reverse used at the other end of the car, is recommended for various tests. The evidence obtained from split loading is a splendid means of studying the best method of packing, after which the more desirable method can be adapted.

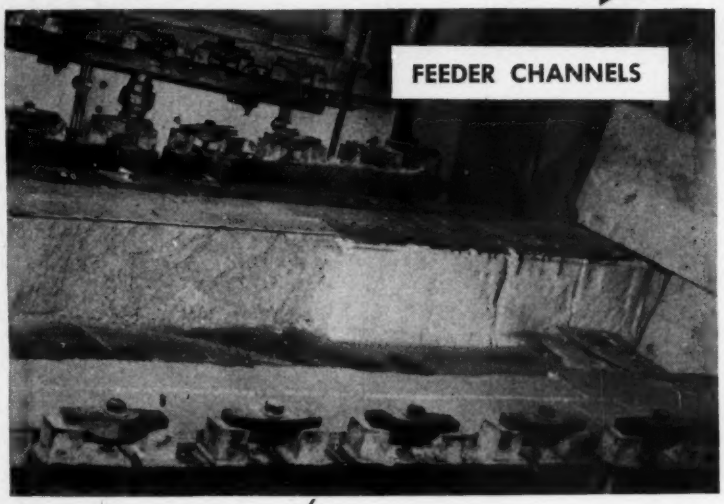
"Freight Claim Prevention Activities Regarding Loading, Stowing and Handling of Glass Consignments" was the subject of the paper presented by W. T. Erneste, Baltimore and Ohio Railroad. The Baltimore and Ohio Railroad handled claims amounting to 4 million dollars in 1952, of which $144,000 were for glass. In 1943, there

(*Continued on page* 40)

The trend is to **MONOFRAX®**

FUSED CAST

refractories



YOU CAN SEE THE DIFFERENCE between these two types of feeder-channel blocks. This is after three years on flint bottle glass. The clean, smooth blocks next to the tank entrance are MONOFRAX MH fused cast refractories. Though this is the hottest, most corrosive part of the channel, there are no signs of pitting or grooving. In contrast, the other material is pitted and grooved badly and shows evidence of considerable joint attack. The spongy appearance of the blocks indicates a probable source of stones or cords in the glass.

This plant now has on order, or is in the process of installing, 18 complete feeder channels using MONOFRAX MH blocks right up to the bowls. It is anticipated that glass quality will improve and that block life will be extended — possibly to two full campaigns. With this longer service, the savings in cover blocks alone may amount to several thousand dollars per channel. Does this sound worth investigating?

FOUR PLANTS, operated by a large flat glass producer, now use MONOFRAX H blocks in port neck sides and crowns . . . with adequate reason. Experience shows that these areas of weakness are strengthened materially; that type H blocks are unaffected by the high heat; and that there is practically no "flaking" nor spalls to block the ports or enter the melt.

CARBORUNDUM

Registered Trade Mark

Dept. L-14, Refractories Division

The Carborundum Company, Perth Amboy, N. J.

LOOK, JOE!
THE ONLY FAST, ECONOMICAL WAY TO RELINE THAT FURNACE or BOILER is the "CLIPPER WAY"
ANY SPECIAL SHAPES . . .
Skews, Splits, Angles, Soaps
CUT IN SECONDS
WITH A
Dustless
Clipper
MASONRY SAW
CUT IN 24 SECONDS
CUT IN 12 SECONDS
CUT IN 17 SECONDS
CUT IN 19 SECONDS
CUT IN 11 SECONDS
CUT IN 13 SECONDS
CUT IN 7 SECONDS
15 MODELS PRICED FROM $265
A CLIPPER MASONRY SAW WILL PAY FOR ITSELF FROM YOUR SAVINGS IN TIME AND MATERIAL!
Every shape and size refractory cut in seconds! Perfect fitting reline jobs that last longer — cost less. And Clipper's Patented features give you DUSTLESS cutting, instant Portability and complete flexibility.
It's YOURS on...
FREE
TRIAL . . .
Discover how CLIPPER will increase profits by increasing production at reduced costs. "On the job" FREE TRIAL guarantees satisfaction at no obligation.
DEPEND on CLIPPER SUPERIOR BLADES
...all specifications of Abrasive, Diamond & "CBR" (Break-Resistant) Blades guaranteed to, "Consistently Provide the fastest cut...at the lowest cost...with the greatest ease!"
MODEL HD
OUR ONLY BUSINESS FOR NEARLY 20 YEARS... MASONRY & CONCRETE SAWING
SAME DAY SERVICE FROM YOUR NEAREST FACTORY BRANCH —SEE BELOW
Clipper
NATION-WIDE DIRECT FACTORY SERVICE
"4 OUT of 5" Concrete Saw Users Choose CLIPPER "CONSAWS"
For Sawing Repair Patches and Trenches in Floors, Runways and Streets
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☐ CLIPPER ABRASIVE BLADES
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ADDRESS
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CONFERENCE ON GLASS PROBLEMS . . .

(*Continued from page* 38)

was $118,225 paid for glass claims, and in 1947, there was $349,000 paid in similar claims. The carrier is, therefore, most interested in reducing these costs. Within a radius of 20 miles of Pittsburgh, 18 glass factories are served by the Baltimore and Ohio Railroad, involving the use of 83,000 cars a year. Next to eggs, glass is the most fragile material handled by the railroads.

Equipment is highly important and boxcars must be light, have good doors and be constantly repaired and reconditioned. The B & O has 630 men reconditioning an average of 960 cars per month. New cars are being designed to improve or prevent the tendency toward breakage. Improved frame construction, end-wall construction, materials and design are all being considered to reduce the hazard of breakage. Movies to create a vigilant psychology among the employees have been used. A "flying squadron" of five men to investigate the causes of all accidents has been created to suggest methods of reducing such damage.

On Thursday evening, December 3, a most enjoyable dinner was given at the Urbana-Lincoln Hotel. Dr. H. H. Blau presided and remarks were made by acting President Morey of the University, and Professor A. I. Andrews of the Ceramic Department. John G. Pace, Personnel Supervisor, Athletic Association, University of Illinois, reviewed the entire subject of intercollegiate athletics with special emphasis on football.

RESEARCH DIGEST . . .

(*Continued from page* 29)

vitiate the results if not entirely removed. The very fine powder which adheres to the grains is finally removed by several washings in an organic solvent, and the cleaned, sieved grains are dried rapidly at 100°.

After cooling in a desiccator, enough of the glass is weighed out to correspond to a 2-ml. volume of the bulk glass. This is placed in the dry silica crucible and heated at 100° for approximately one half hour. The water in the conical flask is heated to the boiling point, and when all the carbon dioxide has been evolved, as shown by an indicator, the flask is quickly lowered and the crucible, still at 100°, is placed in position. The flask is at once replaced and the heating continued. The time at which the first drop of water leaves the crucible is taken as the start of the test.

To estimate the alkali which has been extracted, the flask in position is interchanged with another containing boiling, carbon-dioxide-free water. The contents of the first flask are titrated, using a back-titration method with 0.001N acid and carbon-dioxide-free 0.001N alkali, bromothymol blue being used as the indicator. The flasks are interchanged as often as is considered necessary to enable the extraction versus time relationship to be measured. This technique does not require the cessation of the test when a measurement is made.

• Announcement has been made of the election of Charles B. Elledge, General Electric Company, as President of The Material Handling Institute, Inc. for 1954.

REFRACTORY TEST FURNACE shown above is the only one of its kind in the industry. Temperatures up to 2800° F. check Permanente Brick for deflection, resistance to thermal shock and chemical attack—only three of 86 rigid tests for quality!

86 RIGID TESTS ASSURE LONGER CHECKER LIFE

WITH PERMANENTE PERICLASE BRICK!

If you are looking for ways to get greatly extended checker life for your regenerative continuous glass furnace, take a look at these facts:

Permanente Periclase Basic Brick must meet at least 86 tests for quality and performance—far more than required for any other brick available today!

These tests, *plus* intensive laboratory research and nine years of careful studies of results in many operating furnaces, prove that:

A properly installed checker setting of Permanente Periclase Brick can last as long as four years with no repairs required.

Permanente brick is now available to you, no matter where your plant is located.

Call or write principal sales offices: *Chemical Division,* Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California; First National Tower, Akron 8, Ohio.

Permanente Periclase Brick is DESIGNED ESPECIALLY for Glass Furnaces, giving:

- Resistance to chemical attack.
- Maximum MgO per unit volume.
- Maximum density with absence of connected voids.
- Homogeneous construction.
- Free from impurities.
- Great volume stability.
- Clean edges, accurate dimensions.

Standard and special shapes available, both burned and unburned, in the following types: Periclase "A" and Periclase "D" for checkers. Periclase "D" for port arches and side walls; Periclase "D" and Chrome-Periclase "A" for checker chamber crowns and walls.

Installation advice on request

Kaiser Chemicals

Pioneers in Modern Basic Refractories

Basic Refractory Brick and Ramming Materials • Dolomite • Magnesia • Magnesite • Alumina • Periclase

NEW CHIEF ENGINEER FOR NIAGARA ALKALI

Hallett B. Addoms has been appointed Chief Engineer for Niagara Alkali Company, according to a recent announcement made by J. Clarke Cassidy, President of the firm.

Mr. Addoms was graduated from Yale University in 1940. After being associated with Hercules Powder Company, he joined the Niagara Alkali organization in 1945, where he has been connected with development, operation and engineering. Mr. Addoms succeeds William C. Brooks who is retiring after 24 years as Chief Engineer of the company, but who will be retained for consulting engineering.

BAUSCH & LOMB PROMOTIONS

The promotion of William H. Webb to Superintendent of Manufacturing in Bausch & Lomb Optical Company's Instrument Division has been announced by Carl A. Day, Vice President.

A graduate of the University of Rochester where he earned a B.S. degree in Mechanical Engineering, Mr. Webb joined the optical firm in 1937. In 1944, after working as a manufacturing coordinator, he was promoted to assistant superintendent of the Navy Building plant where thousands of aerial camera lenses and optics for military gunfire control equipment were produced during World War II. Late in 1945, he returned to the firm's main plant as assistant superintendent of its Precision Optics Division. He was promoted to division superintendent four years ago.

Named to succeed Mr. Webb as head of precision optics manufacture was William R. Knowlton. Mr. Knowlton joined the company's process engineering staff in 1942 after earning a mechanical engineering degree from Rensselaer Polytechnic Institute. A methods engineer from 1945 to 1950, he transferred to the manufacturing engineering staff, a post he held until last August when he became assistant to Mr. Webb.

P.E.I. APPOINTS RESEARCH FELLOW

James H. Giles, Jr. has been appointed the Porcelain Enamel Institute's Research Fellow at the National Bureau of Standards in Washington, D. C.

Mr. Giles graduated from North Carolina State College in 1950 with the degree of Bachelor of Ceramic Engineering. He also completed his work for the degree of Master of Science in Ceramic Engineering in July 1951 at the same college.

• Burrell Corporation has been appointed exclusive distributor in the United States for English-made Stanton balances. The move makes available to American laboratories the manufacturer's complete line of chemical and non-chemical balances.

HAZEL-ATLAS APPOINTMENTS

The Hazel-Atlas Glass Company has announced the appointment of George B. Dakan as Manager of its Atlanta, Georgia, sales office. Mr. Dakan, who has been associated with the company sales activity for many years, more recently as salesman in the Atlanta territory, succeeds C. V. Gowing upon his retirement.

Also announced is the opening of a new sales office in Louisville, Kentucky, located in the Martin Brown Building. J. Edward Porter will be the Manager of the new office. Mr. Porter has been associated with the company's sales division for many years, more recently having been located at the Cincinnati office.

The company has also announced the consolidation of its Kansas City and Oklahoma City sales offices. The sales activity heretofore conducted through the Oklahoma City office will be consolidated with the Kansas City office. Brooks Gall is Manager of the Kansas City office and with him are associated Robert H. Short and Stanley J. Franzell.

KAYLO DIVISION APPOINTS GENERAL MANAGER

The appointment of William J. Stewart as General Manager of the Kaylo Division, Owens-Illinois Glass Company, has been announced by Carl R. Megowen, President. Mr. Stewart succeeds J. Gordon King who resigned recently to join the Plax Corporation.

The new Division General Manager is a veteran Owens-Illinois employee experienced in plant efficiency methods and industrial relations. He joined the company in 1930 at the Charleston, W. Va., plant and later supervised industrial engineering work there and at Owens-Illinois plants in Terre Haute and Gas City, Indiana. His first assignment in the general offices was as a staff industrial engineer in 1939. He was transferred to the Charleston plant and returned to Toledo in 1945 as Chief Industrial Engineer for the Glass Container Division. Four years ago he was appointed Chief Industrial Engineer in the Administrative Division, a position he will retain along with his new one.

HARBISON-WALKER NAMES SENIOR MINERALOGIST

C. Burton Clark, a member of the Research Department of Harbison-Walker Refractories Company since 1937, has been named Senior Mineralogist. Mr. Clark graduated from the University of Illinois with the degree B.Sc. in Ceramics, and subsequently took graduate work in the Department of Physics of the University of Pittsburgh. The laboratory section which he heads is devoted to studies involving petrography, spectroscopy and X-ray diffraction.

Mr. Clark is a charter member of the Spectroscopy Society of Pittsburgh, and is its past-president. His contributions in the field of research are in the fields of petrography, spectroscopy, X-ray diffraction and various types of refractories.

• Don McAnally, assistant to the director of public relations for Libbey-Owens-Ford Glass Company, has been elected to the publicity committee for reinforced plastics of the Society of the Plastics Industry, according to an announcement by Langdon P. Williams, Society Public Relations Director.

FIRE PREVENTION . . .

(*Continued from page* 24)

have been made of carbon dioxide extinguishing units.

We can understand and appreciate the glass industry's resistance to spray sprinkler protection for machines and roof over the machines. We, however, firmly believe that proper application of these facilities under good housekeeping conditions will reduce fire loss and business interruption record.

There has been much individual discussion between the fire underwriters and individual glass industries on fire prevention and fire protection for bottle forming departments. We believe much good will be accomplished by a round table discussion of the problem by the glass industry and the underwriters, acting through their chosen respresentatives, such as the Glass Container Manufacturers Institute. This should be followed by field tests. Progress can only be made through an exchange of ideas and a mutual understanding and respect for the other fellow's problems. Working together, we can unquestionably make progress for the benefit of all parties.

ACHESON COLLOIDS APPOINTMENTS

Bart C. Dickey has been appointed Process Development Engineer in the production department of Acheson Colloids Company. Mr. Dickey will be responsible for improving and developing process operations for current and new products. An M.E. graduate of Purdue University in 1947, he worked for the Beloit Iron Works and the Port Huron Sulphite & Paper Company before joining the Acheson organization.

Also announced is the appointment of Frank M. Hunter as Service Engineer. Servicing all of northern and lower Michigan, with headquarters in Detroit, Mr. Hunter will provide technical assistance to industries using colloidal graphite and other Acheson products in their operations. After receiving B.S. and M.S. degrees in chemistry from Michigan State College, Mr. Hunter worked with the Chrysler Corporation, the Hudson Motor Company and Mueller Brass Company, among others. During World War II, he was with the Chemical Warfare Service.

PENNSYLVANIA CERAMICS ASSOCIATION ELECTS OFFICERS

The Board of Directors of the Pennsylvania Ceramics Association has elected the following officers for 1954: *President,* J. H. Kruson, Big Savage Refractories Corp.; *Vice President,* G. Bickley Remmey, Richard C. Remmey Son Company; *Managing Director,* R. W. Gery, Glen-Gery Shale Brick Corp.; *Treasurer,* D. O. Evans, Corning Glass Works; *Secretary,* Roy Ehman, The Pennsylvania State University.

At the same meeting, the following additional board members were appointed for a one-year term: J. J. Boehler, Heintz Mfg. Company; C. Burton Clark, Harbison-Walker Refractories Company; J. D. Clark, Foote Mineral Company; J. R. Coxey, Glen-Gery Shale Brick Corp.; Roy Ehman, The Pennsylvania State University; R. W. Gery, Glen-Gery Shale Brick Corp.; F. S. Huot, Kopp Glass, Inc.; G. Bickley Remmey, Richard C. Remmey Son Company; George W. Reuning, Big Savage Refractories Corp.; Robert K. Thomas, Warner Company.

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Powdered Silica of the highest Quality results from grinding these pure Ottawa and Rockwood sands.

• The Silica Sands of Ottawa and Rockwood, purified by nature's processing over untold ages . . . mined, cleansed and graded by special refining at our plants, offers glass-makers Silica Sands of supreme quality.

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SYMPOSIUM ON INSTRUMENTATION TO BE HELD

For the first time, the makers and "users" of instruments for industrial hygiene will be brought together at a technical and scientific symposium to be held May 24 through 27, 1954. The event, co-sponsored by the University of Michigan's Institute of Industrial Health and School of Public Health, will be of special interest to not only manufacturers and industrial hygienists, but also physicists, chemists, safety engineers, meteorologists, noise investigators, engineers and others in related fields.

The program will include exhibits, discussions and technical papers on instrumentation in the following areas: sampling and analyzing for air contaminants in work places; laboratory type instruments for industrial hygiene; atmospheric pollution evaluation; measuring air velocity and metering air; measuring sound and vibration; measuring ionizing radiations; measuring physical phenomena (light, etc.); and "home-assembled" instruments.

DR. W. J. McCAUGHEY NAMED BLEININGER AWARD WINNER

Dr. William J. McCaughey, Chairman of the Department of Mineralogy at Ohio State University, has been named the 1954 recipient of the Albert Victor Bleininger Award. The announcement was made at the December meeting of the Pittsburgh Section of the American Ceramic Society by Robert Limes, Chairman of the Section.

The medal and scroll, representing the award, will be presented to Dr. McCaughey at the Bleininger Award Dinner to be held in March.

MULLITE ELECTS PRESIDENT

The Mullite Refractories Company has announced the election of Edward L. Bohn as Vice President of the company.

Mr. Bohn joined Mullite in 1952. He was formerly Vice President of Chas. Taylor Sons Company, with whom he was associated for 15 years. Prior to that time, he was with North American Refractories as sales representative.

In addition to other duties, Mr. Bohn will work closely with industry in the proper use and application of super refractories.

A.C.S. SECTION MEETING

The second Fall Meeting of the Trenton Section of the American Ceramic Society was attended by over 60 members and guests.

The program consisted of a panel discussion on the subject, "Is Proper Glaze Fit Best Obtained by Glaze Manipulation or by Body Adjustments?" Don Van Gordon, Metal & Thermit Corporation, acted as Moderator, while the panel was composed of the following: Fred Simen, National Ceramic Company; Don Servis, Robertson Mfg. Company; Dr. John Koenig, Rutgers University; Roland Tucker, Trenton Potteries; Harold Prior, Titanium Alloy Mfg. Company.

The following officers were nominated for 1954: *Chairman*, Elmer Miller, Washington Porcelain Company; *Vice Chairman*, Harry Barr, Consolidated Feldspar Corp.; *Secretary-Treasurer*, Martin R. Waters, Wenczel Tile Company; *Counsellor*, Ogden A. Kantner, United Clay Mines Corp.

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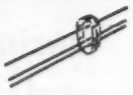

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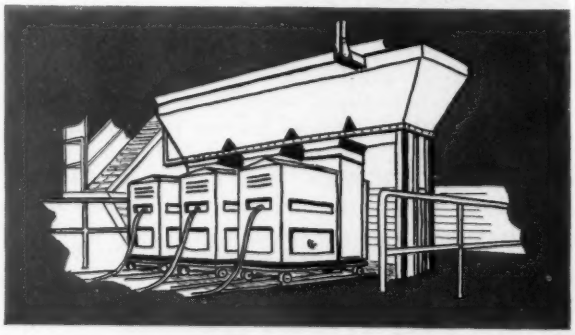

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NATIONAL GYPSUM COMPANY • BUFFALO 2, NEW YORK

G.C.M.I. MEETING . . .

(*Continued from page* 21)

he estimates mid-1954 will show an index of 222. He also expects a steel production rate of 80 per cent of capacity and a drop of 15 to 20 per cent in auto production between 1953 and 1954.

He reminded the audience that any downturn could be reversed by the Federal Government's use of the approximately $60 billion in defense funds already appropriated but not spent. This money could, Mr. Merrifield pointed out, help the heavy capital goods industries to compensate for the drop in private business orders now being experienced.

The marketing aspects of the milk container segment of the industry were covered by General Manager V. L. Hall who reported for the milk bottle subcommittee of the Committee on Market Research and Promotion. He said a test consumer effort on milk bottles has been launched in the Buffalo, New York, area where radio and TV spot commercials are being used. If the necessary dealer cooperation is secured, a similar test program will be tried in Milwaukee, Wisconsin. The major objective of such local test campaigns is to find a formula for consumer promotion of milk in glass bottles.

The industry effected some savings in freight rates, A. F. Huni, G.C.M.I. traffic executive, told the group, through the Institute's action in connection with certain adjustments.

H. J. Carr, Owens-Illinois Glass Company, introduced Walter A. Edwards, assistant administrator of the business and defense services administration of the Department of Commerce. Mr. Edwards is on leave from his position as Washington liaison man for Owens-Illinois and currently handles container problems in the Department of Commerce.

Ralph A. Lind, the Institute's labor relations consultant, invited all member glass companies to attend the next bargaining session with the Glass Bottle Blowers Association on February 16 in the Astor Hotel, New York City.

The concluding address of the session was by General Mark W. Clark, recently Supreme Commander of the United Nations Forces in Korea. The General and Mrs. Clark had been guests at the three-day session. General Clark was introduced by E. F. Ball, Ball Brothers Company, who had served on the General's staff during World War II.

Obear-Nester Glass Company was host to a cocktail party on December 1. G.C.M.I. sponsored the party, dinner and entertainment on the following evening. At this dinner, the Institute presented a silver service to Mr. and Mrs. Howard Herger, Pierce Glass Company. Mr. Herger is immediate past-President of the G.C.M.I. R. A. Blunt, Buck Glass Company, in his presentation speech, called the Hergers the "best loved couple" in G.C.M.I.

Lupton Avery was the leading prize winner at the golf tournament, winning the low gross award.

The 1954 Spring Meeting of the Institute will be held at White Sulphur Springs, West Virginia, May 17 to 19. The program committee named to handle this meeting includes B. W. Cremers, Wyandotte Chemicals Corporation; F. B. Foster, Diamond Glass Company; and P. I. Heuisler, Jr., Maryland Glass Corporation.

Hovestadt's

"Jena Glass, and Its Scientific and Industrial Applications"

A Reprinting

• Hovestadt's "Jena Glass," translated into English by J. D. and A. Everett, published by Macmillan, 1902, has been out-of-print for years, and the original volumes are now collectors' items.

This book, setting forth the first really scientific study of glass and describing the pioneer efforts to correlate compositions and physical properties, ought to be in every technical library and in the hands of every glass technologist of today. Even though glass technology has progressed far in this half-century, it owes much to the painstaking work so completely and ably discussed in the book, of Winkelmann and Schott and their associates.

A lithoprinted edition of this book is now available.

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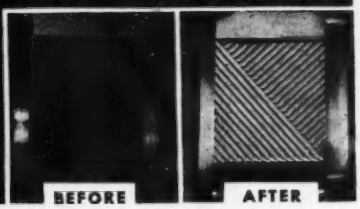

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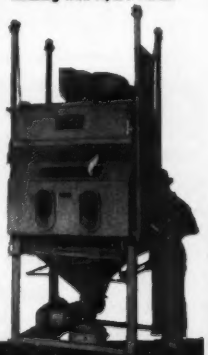

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INVENTIONS AND INVENTORS . . .

(*Continued from page* 28)

It has been found that improved stopcocks are produced by conducting all grinding and lapping operations on the mating surfaces of both the barrel and plug members of the stopcock while the mating surfaces are still unbroken (that is before any of the necessary ports in either the barrel or plug members have been formed), and then forming the necessary ports as a last step following the completion of the grinding and/or lapping operations by a method, such as drilling, which will not cause deformation of the ground surfaces. According to prior methods, this sequence is reversed, the necessary ports being formed in the barrel or plug (or in both) before the grinding or lapping operations are undertaken.

Stopcocks made in accordance with this method are said to have a marked ability to withstand a large number of turns without the formation of any streaks or discontinuities in the lubricant between the mating surfaces.

The patent contains two claims and the following references were cited: 914,244, Conradson, Mar. 2, 1909; 2,387,013, Fuller, Oct. 16, 1945; 2,427,849, Garwood, Sept. 23, 1947; 2,465,388, Monack et al., Mar. 29, 1949; and 2,589,985, Borneman, Mar. 18, 1952.

PORCELAIN ENAMEL INSTITUTE SCHEDULES 1954 MEETINGS

The Porcelain Enamel Institute has announced the dates and locations of its meetings during 1954, which are as follows: Midyear Divisional Meetings, May 12, 13 and 14, Edgewater Beach Hotel, Chicago, Illinois; Shop Practice Forum, September 8, 9 and 10, University of Illinois, Urbana, Illinois; Annual Meeting, September 29, 30 and October 1, The Greenbrier, White Sulphur Springs, West Virginia.

• Three batch plant silos have been completed for Westinghouse Electric Corporation at its Lake Catherine, Arkansas, plant by The Rust Engineering Company under contract with Frazier-Simplex, Inc. The reinforced concrete silos, 60 feet high and 30 feet in diameter, will be used for storage of glass component materials such as sand, syenite, soda ash and cullet. Silo walls, seven inches thick, were constructed in five days by the sliding form method of concrete construction.

NOISE PROBLEM SOLVED BY USE OF FIBERGLAS

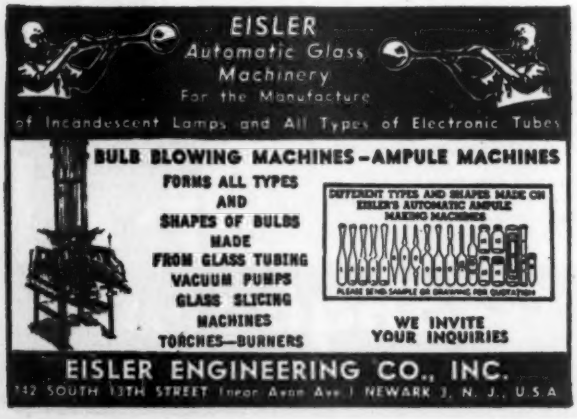
Officials of the Toledo Sports Arena have conquered a noise problem which has plagued them for six years. Poor hearing conditions have been corrected with the installation of 3,000 Fiberglas Noise-Stop Baffles in the ceiling area and on some wall surfaces, Andy Mulligan, Arena General Manager, has announced.

The baffles absorb sound waves and reduce echoes which have been bothersome to spectators, performers and arena officials. The baffles work this way: as the sound waves travel away from their source, they strike the baffles before being reflected back toward the audience. Each baffle has a plastic film facing which transmits the sound energy into the Fiberglas board by diaphragmatic action. Sound then is absorbed in the millions of tiny air spaces formed by the fibers of glass. Thus, the sound energy is dissipated to a considerable extent before it has a chance to irritate the audience. Because the fibers of glass in the baffles will not burn, the installation fits the fire safe pattern of the arena construction.

The baffles, produced by Owens-Corning Fiberglas Corporation, were installed by the arena's own maintenance crew. The lightweight baffles—six pounds each—were raised in "packages" to the top of a scaffold where a workman hooked them over wires strung under the ceiling. The wires were installed first with turnbuckles to prevent sagging after the baffles were hung.

• A new firm, Ceilite Corporation, has been established with general offices and plant located in Allison Park, Pa. William K. Gray is President and General Manager of the company, which will manufacture corrugated structural glass panels for home, commercial and industrial decorative applications. L. H. Jaquay is Vice President. Both Mr. Gray and Mr. Jaquay were formerly with American Cyanamid Company.

• Gordon W. Reed, Chairman of the Board, and Harry O. King, member of the Board of Directors of Glass Fibers, Inc., have been presented with the Award for Meritorious Civilian Service for their outstanding accomplishments as special consultants to the Air Force during recent years. A third recipient of the award at the same ceremony was Jacob Saliba, a special consultant to the glass fiber firm.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BROCKWAY ANNUAL MEETING

The Annual Meeting of the stockholders of the Brockway Glass Company, Inc. recently held resulted in increasing the number of members on the Board of Directors from six to seven. The following directors were re-elected: R. L. Warren, Sr., Glenn A. Mengle, F. B. Hess, A. M. Saperston, D. L. Sheesley and Jean Masbach. Elected as new director was R. L. Warren, Jr.

At the meeting of the Board of Directors subsequently held, the following officers were elected: R. L. Warren, Sr., Chairman of the Board; Glenn A. Mengle, President; F. B. Hess, Vice President; C. Chintala, Vice President; A. M. Saperston, Secretary; D. L. Sheesley, Treasurer; R. L. Warren, Jr., Assistant Secretary and Treasurer; and Jean Masbach, Assistant Secretary.

H. CLAYTON SEAMAN OF ARMSTRONG CORK DIES

H. Clayton Seaman, Jr., Manager of Glass Container Sales for the Armstrong Cork Company, died at his home after a long illness at the age of 56.

The Armstrong executive had been a pioneer in the plastic closure business, in recent years was active in the affairs of the Glass Container Manufacturers Institute, and was well known in the packaging field generally.

A native of Brooklyn, New York, Mr. Seaman joined the Armstrong organization as a closure salesman in the New York office in 1931. In 1939 he became Manager of Glass Container Sales. Two years later he was transferred to the company's general offices at Lancaster, Pa., as Manager of Glass Container Sales for the company. He was a veteran of World War I.

He is survived by his wife; two sons, Robert Clayton and James Theodore; three grandsons; his parents; a brother and a sister.

• Pittsburgh Corning Corporation has opened a branch sales office at 57 Bloor Street, West, Toronto, Ontario, Canada. E. H. Martin, Jr., formerly manager of Foamglas low temperature insulation sales, has been appointed District Manager for Pittsburgh Corning's Canadian sales operations.

• Chalmer G. Kirkbridge, President and Director of the Houdry Process Corporation, has been elected President of the American Institute of Chemical Engineers for 1954, according to an announcement made during the 46th Annual Meeting of the Institute.

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Need for production: Simpson Mixer, Raymond Mill, one or two Vibrating Screens. Please give full particulars. P. O. Box 1351, Church Street Station, New York 8, New York.

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MACHINE OPERATORS wanted. Two 28 machine paste mold operators for work in Colombia, South America. Attractive living accomodations provided with adequate salary and other compensations including travel, lodging, food, etc. State qualifications, experience and salary expected. Reply Box 145, c/o The Glass Industry, 55 West 42nd St., New York 36, N. Y.

WORKS MANAGER. Leading manufacturer of mass-produced small consumer articles seeks Works Manager with extensive administrative and production experience in a process manufacturing industry. Successful experience in heavy materials handling necessary. Multi-plant operation in highly-competitive field. M.E. degree. Age: Under 45. Location: Midwest. Salary: $20,000 plus liberal executive compensation plan bonus. Reply Box 146, c/o The Glass Industry, 55 West 42nd St., New York 36, N. Y.

• Alfa Photo Corporation, New York City, has been appointed the American agent for optical and filter glass manufactured by Chance Brothers Limited, England. The New York office will function as liaison to the American users of optical and filter glass, answer inquiries and expedite orders.

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